

Airfield Research Group Ltd

ARG Research Note No.51: RAF Coltishall Historical Appraisal

Parts 1-7

Paul Francis – September 2013



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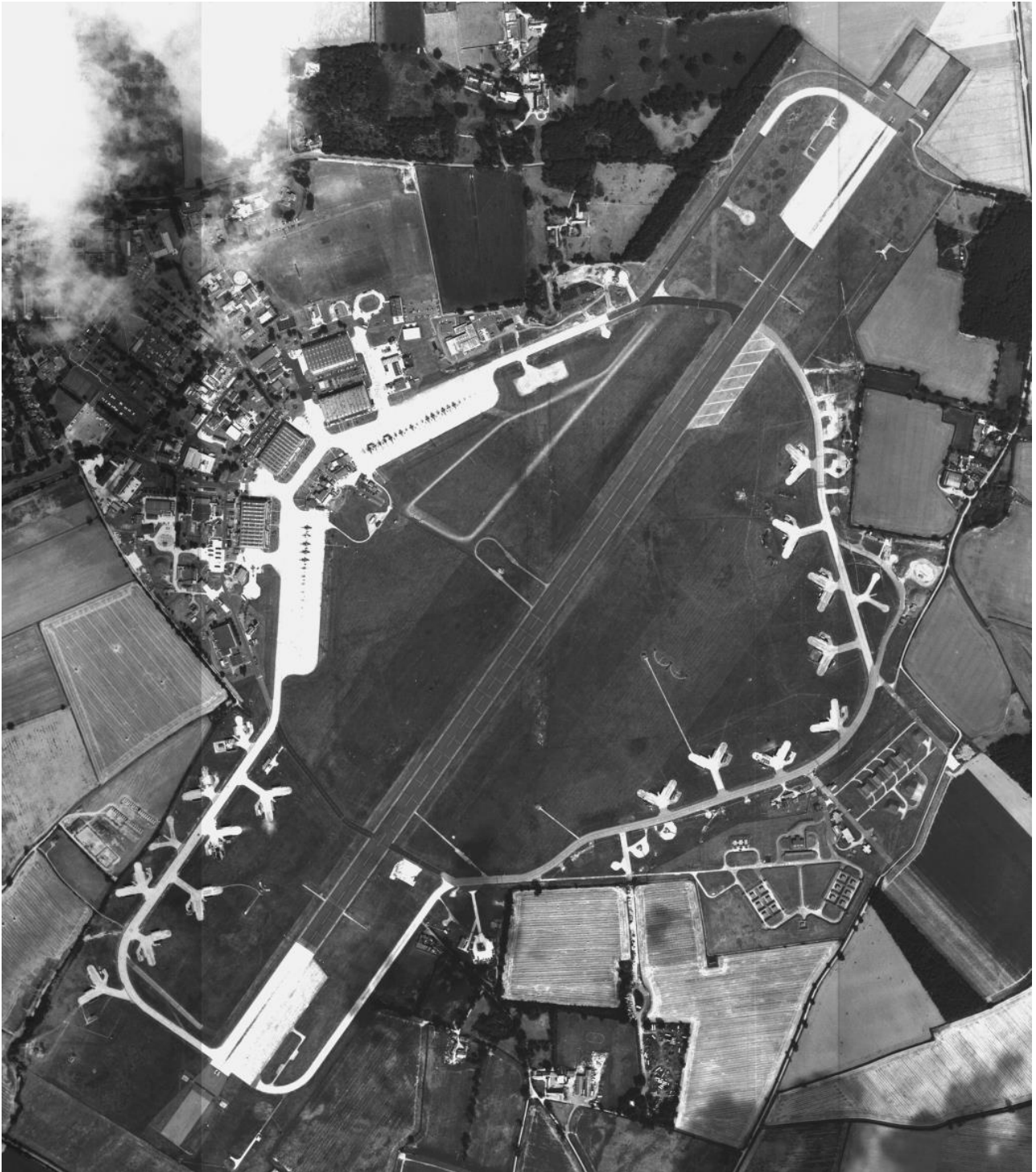


Plate 1: Aerial view of RAF Coltishall
original source and date unknown

ABBREVIATIONS

AAGW	Anti-Aircraft Guided Weapon
ADGB	Air Defence of Great Britain
AMWD	Air Ministry Works Department
ARS	Air-raid Shelter
ASP	Aircraft Servicing Platform
ATC	Air Traffic Control
AVTUR	Aviation turbine (jet) fuel
BFI	Bulk Fuel Installation
CADF	Commutated Antenna Direction Finding
CFE	Central Flying Establishment
DHE	Defence Housing Executive
ESA	Explosive Storage Area
ESS	Electronic Servicing Squadron
EWS	Emergency Water Supply
FFMT	Field Force Mechanical Transport
GSES	Ground Support Equipment Section
H&V	Heating and Ventilation
IFF	Identification, Friend or Foe – a device which returns a signal from ground radar identifying the aircraft as friendly
ILS	Instrument Landing System
IETF	Installed Engine Test Facility
LCN	Load Classification Number – a ‘thickness / strength’ rating for runways and pavements
LOX	Liquid Oxygen
M&E	Mechanical & Electrical
M/G	Machine gun
ORP	Operational Readiness Platform
PAPI	Precision Approach Path Indicator
PAR	Precision Approach Radar
PBX	Private Branch Exchange (telephone)
PRE	Product Receipt Enclosure
PSA	Property Services Agency
PSI	Public Support Initiative
PSP	Pierced Steel Planking
POL	Petrol, Oil and lubricants
RHAG	Rotary Hydraulic Arrestor Gear
Sandra	Typically three searchlights sited in a triangle around the aerodrome perimeter which could produce a cone of light to assist lost aircraft.
SICARD	
TACAN	Tactical Air Navigation System
TIF	Technical Information Flight
UETF	Uninstalled Engine Test Facility
WAAF	Women’s Auxiliary Air Force
WRAF	Women’s Royal Air Force
WSM	Work Services Manager

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Part 1: Document Scope

1.1 Preface

This is the main report (parts 1 to 7) which examines the infrastructure and airfield at the former RAF Coltishall. It is accompanied by a further four stand-alone reports which are building gazetteers of surviving structures within the part of the former RAF Coltishall owned by Norfolk County Council. None of the reports cover the history of the station; there are already two really good published books on this subject.

Parts 1 to 7 describes in some detail, the reasons of how and why the station was built and the political events at the time of its earliest planning, the layout, why it changed from being a bomber station to that of a fighter, as well as the cost of buildings, layout of services and construction. It also examines WWII airfield structures including runway lighting, defence and air-raid shelters. It covers the complete station, including that part in the ownership of the Ministry of Justice.

Parts 8 to 12 discuss each post-war building in more detail – as these are picture heavy it has been necessary to divide buildings into five parts, these are:

- Part 8 Control Tower and Hangar
- Parts 9 Technical Buildings
- Part 10 / 11 Domestic Buildings, SHQ and Officers' Mess Complex
- Part 12 Bomb Stores

The above are restricted to the part of the station that is in the ownership of Norfolk County Council. It has not been possible to include too much information on the buildings in the ownership of the Ministry of Justice as the records for these buildings were not available.

1.2 Sources and Limitations

The main source for this report are certain AIR 2, AIR 20, AIR 28 Air Historical Branch and WO 166 files preserved at The National Archives, Kew, London. The Operations Record Books for the war period describing operations conducted from Coltishall and its satellites are first class but lack the accompanying volume containing the appendices. These therefore, of the crucial period 1939 to May 1943 inclusive, are missing with the result that there is little primary source information for airfield defence. From June 1943 appendices are included as brief notes after every monthly entry and this makes interesting reading.

Another major source of information was the contemporary site and building drawings and files which were available on site at Coltishall. I have also made use of a photographic survey carried out by Aldon Ferguson in 2006. Another useful source has been fieldwork, much of it being carried out by members of the Airfield Research Group, particularly out on the airfield which has led to the discovery of WWII runway flare path lighting, metal tracked runways and the important find of two out of three Pickett-Hamilton forts.

The discovery of the WWII flare path lighting as well as taxi track lighting and the forts is considered to be of historical importance and significance. One of the forts for example, has in situ gun mounts which I have not seen before.

There are a number of WWII buildings and pillboxes located around the airfield boundary, beyond the Heras fencing and although most of these are extremely difficult to get at and record, some are included within this report.

1.3 Acknowledgements

I would like to thank Mervin Cousins, Jonathan Looker and the security staff at the former RAF Coltishall site, without whom, my task would have been extremely difficult. I would also like to thank David Gurney of Norfolk County Council and members of the Airfield Research Group who gave up their time during weekdays and at weekends to assist me. Without their enthusiasm and knowledge, it would be likely that much of the wartime archaeology would have remained undiscovered. I would also like to thank the Air Historical Branch (AHB) and The National Archives.

1.4 Observations of the Buildings at the Former RAF Coltishall

Having studied the station's planning, design and construction I feel that I am now in a position to comment on the station as it survives in 2013 and its importance.

Although outside the scope of this study in any great detail, I think it is only right that I include the MOJ Site (HMP Bure) and both sets of married quarters with regards to the context of the complete station.

1.4.1 Ministry of Justice Site

There are a few key pre-war buildings within the MOJ site, particularly within the buffer zone that are of particular importance to the history of the station. These structures as far as is known have not been recorded to a recognised standard and as such are vulnerable. If any of these structures were demolished, this act would seriously undermine the group value of the former RAF site as a whole. It is not only the buildings that are important, but also the street arrangement that might be spoilt by redevelopment. The 'Y'-shaped planning of the whole station is a key characteristic of the original planning scheme and should be preserved though it is acknowledged that some of the original roads may have already been lost. The following pre-war designed buffer zone buildings are of interest:

- Armoury (11)
- Lubricant and inflammable store (13)
- Clerk of Works Offices, workshops and water tower etc (18)
- Central heating station (19 / 20)
- MT vehicle sheds (36 / 37 / 116)
- Articulated trailer shed (38)
- Link trainer (59).

There are two post-war buffer zone buildings that are considered to be of importance to Coltishall:

- Lightning simulators (291 and 292)

Within the prison secure site there has recently been some notable demolition without proper recording of buildings within a Conservation Area, in the form of the pre-war ration stores (42) and both post-war WRAF accommodation blocks (202A / 202B).

The important pre-war buildings within the prison secure area are:

- Barrack blocks type 8/84 (27 A to E)
- Barrack block type 8/56 (28)
- Dining room and institute (44)

1.4.2 Buildings retained by MOJ which are outside the wire

- Standby Set House (55 / 112)
- WAAF / WRAF Decontamination Centre (29)

These two buildings are considered to be very important to the history of RAF Coltishall. In particular, the standby set house which is superb and unique outside the RAF. I cannot stress enough the importance of this building, the presence of such a fine English Electric diesel engine and all of its supporting plant still in place is second to none on ex-military airfields in the UK. Over the years I have seen so many of these dismantled and sold abroad, the last four removed for example, consisted of two at St Mawgan and two at Uxbridge, the latter only last year. Granted the engine at Coltishall is not original and dates to the early 1960s but it is a fantastic working example of British engineering.

The WAAF decontamination centre is also of immense interest and is a temporary version of Coltishall's building 32 – it is often the case that buildings such as these are in a poor state, located on temporary airfields, whereas this example appears to be in good condition.

1.4.3 Officers' Married Quarters

The officers' MQ site is a prime example of garden city style planning, whereby a natural triangular-shaped site, bordered originally on two sides by public roads, has been used to great effect by the pre-war planners. This idea is not only a brilliant use of space, it also has made best use of the pre-war road network with its existing trees and bushes that provided a natural part of the sites passive defence.

There is a central spine access road that used to terminate in a cul-de-sac just north of the officers' mess, but now has been extended southwards to form a triangle at the rear of the mess. The original houses and those constructed post-war are southerly and easterly aspect homes that have been placed with large open spaces between them as part of the passive defence scheme – it is important therefore that this open space is retained.

1.4.4 Airmen's Married Quarters

The most important part of the airmen's married quarters' site is that formed by Hoveton Place and Cromes Place which forms the bulk of the original pre-war site. Many of the houses here still display their camouflage scheme which today is a graphic reminder of the history of the base and forms an excellent backdrop to the approach onto the airfield.

1.4.5 Domestic and Technical Buildings

The technical and domestic area on the downside is a little fragmented by divided ownership, a sizable portion of it forming the buffer zone and another section is the secure prison site. However, there are some good examples of pre-war buildings within the ownership of Norfolk County Council and while there are many other examples of these buildings elsewhere, their original function and subsequent modifications reflect the change of use and development of the station over a 70 year period.

These are:

- Hangars (1 to 4)
- Petrol tanker sheds (6, 6A to 6C)
- Aviation fuel installations (8 / 301)
- Pyro stores (10 / 10A)
- Main workshops (12)
- FFMT shed (14)
- Parachute store (15)
- Watch office with met section (16)
- Main stores (17A)
- M/G range (22)
- 40 ft M/G range (24)
- Station headquarters and operations block with speech broadcasting building (31 / 35)
- Decontamination centre (32)
- Station sick quarters and annexe (33)
- Guard and fire party house (40)
- Sergeants' mess (41)
- Officers' mess (50)
- Air-raid shelters (various)

Most of these have been extended post-war, almost all are devoid of their original windows, but the best examples are as follows:

- Hangars
- Main stores which although have been extended with a new wing, has been carried out by the original architects, to a very high standard.
- Annexe to the sick quarters which is excellent, having its original plant equipment in situ
- The watch office with met section could potentially prove to be a prime example of its type but it is surrounded by extensions that maybe were practical in terms of their use for military ATC, but architecturally and historically, they have no real significance.
- The station headquarters and operations room have great potential as does the decontamination centre – both are excellent examples of their type.
- The officers' mess complex is a superb example – probably nationally important as it is vastly superior to the example at Duxford which is a grade II listed building.

1.4.6 Technical and Domestic Post-War Buildings

The most important post-war buildings, based on function and how these buildings relate to the development of the airfield with regard to the Cold War, are as follows:

- Armoury (15) – I rate this building highly, it is one of the best examples and is superior to the one at Duxford which is listed. It was one of the first post-war technical buildings built at Coltishall, it also has a direct relationship with the AAGW Site
- Ejector seat stores (21, 97 and 110) – of interest because they were part of the armaments upgrade of the early 1970s in support of the Jaguar
- Gymnasium (100) – although this building has been extended, it is a good example of its type – one of these was demolished two years ago at Oakington
- Uninstalled engine test facility (109)
- Product Receipt Enclosure (PRE) Site (148) – a cluster of concrete revetments, pipes and valves related to fuel entering the site and its distribution
- Bulk fuel installation (BFI) (154, 155, 156 and 157)
- Line huts (261, 262 and 270) without their extensions, these are interesting buildings from the early 1970s and were part of the general upgrading of facilities prior to the introduction of the Jaguar
- Electronics Centre (295) – historically interesting but it is the weakest building in this list given its very poor condition
- Fire section (305) – a heavily modified building but an essential part of the control tower complex
- Jaguar simulator (349).

1.4.7 Airfield

The most important aspect of the airfield is, without doubt, the runway, its associated pavements and grass surface with its hidden pre-WWII and WWII archaeology as well as Cold War revetments. I think it would be a mistake to remove any part of the runway and the taxiway pavements, I believe it should remain intact and that businesses requiring such an asset should be encouraged to relocate to Coltishall.

1.4.8 Bomb Stores / Anti-Aircraft Guided Weapons Site

The bomb stores and AAGW Site are historically important, particularly the latter, since a quick look on Google Earth at the other sites with similar facilities will reveal that the Coltishall example is by far the best in the UK. Together with the pre-WWII designed bomb stores this has elevated the historical importance of the site over and above others where pre-war and WWII bomb stores survive in near complete forms.

Parts 2 to 12 of this and accompanying documents constitute the supporting evidence for the above claims.

Part 2: RAF Expansion

2.1 Introduction

This section looks at the political events in Europe and the Air Ministry expansion schemes that resulted in airfield development in Norfolk and Suffolk. It is largely based on AP3397, the Air Historical Branch narrative titled 'Maintenance', published in 1954 by the Air Ministry.

2.2 Background

By the end of 1932 Germany had commenced to re-arm; Hitler became Chancellor on 1 February 1933 and in the next few years equipped an air force of major proportions. In an attempt to achieve parity with Germany's increasing air strength, the British (National) Government introduced a number of schemes (A-M) for the expansion of the RAF, which followed in quick succession between 1934 and 1939. Five schemes were passed by the Cabinet: 'A', 'C', 'F', 'L' and 'M'. Another three 'H', 'J' and 'K' were formulated but never went beyond the proposal stage although many new RAF stations proposed under these schemes did become part of the next scheme to be passed by the Cabinet. Schemes 'B', 'D', 'E' and 'G' never reached the point of formal submission. This expansion through the successful schemes, led to a large-scale rebuilding programme with existing stations being modernised in keeping with numerous new RAF aerodromes then being constructed between 1934 and 1940.

From 26 May 1934, the selection of airfields was the responsibility of the Works Directorate Aerodromes Board, and their suitability from a civil engineering aspect was investigated by the other specialist departments within the Works Directorate. A works report, which covered all aspects of airfield preparation and layout, was prepared for each station. From this, suitability of the proposed airfield was finally decided upon, requisition papers issued, detailed site plans prepared, as well as airfield grading plans and services were subsequently formulated and contracts let.

2.2.1 Scheme 'A'

This first scheme, adopted in July 1934, called for a front-line strength of 1,544 aircraft (within five years) of which 1,252 were for home defence. The ADGB air-fighting zone of the old 52-squadron scheme was expanded from Gosport in the south to Usworth in the north, so that for the first time since 1918, fighter squadrons were again based in the north-east. New permanent RAF aerodromes in Norfolk / Suffolk planned in 1934 for construction in 1935 were:

Marham	Feltwell	Stradishall.
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(note that Marham was the first to be constructed in the UK followed by Feltwell.)

2.2.2 Scheme 'C'

Scheme 'C' replaced Scheme 'A' when the size of Germany's air force became known in 1935, and came about as a result of Hitler personally stating to Sir John Simon and Anthony Eden in March 1935 that the German Air Force had already reached parity with the RAF. Scheme 'C' was implemented on 22 May 1935 to provide a Metropolitan Air Force of 123 squadrons with 1,500 aircraft within two years. No new permanent RAF aerodromes were constructed in Norfolk / Suffolk to Scheme 'C', although existing stations such as Bircham Newton and Martlesham Heath may have been expanded under this scheme.

2.2.3 Scheme 'F'

Scheme 'F' came about due to further German expansion and proposed a programme of 2,500 first-line aircraft by March 1939. Another reason was the outbreak of the Abyssinian War. It was approved in February 1936, replacing Scheme 'C' before it was completed and allowed for 124 squadrons with 1,750 front-line aircraft. The programme of aircraft construction of the previous schemes was not beyond the capacity of the firms existing in the industry. Scheme 'F' was however, too large for these firms to undertake unaided. It was therefore, decided to bring into operation a number of 'shadow factories'.

The factories in question were the large motor car plants in the Birmingham and Coventry districts where new facilities were to be erected in close proximity to the parent works (hence the term shadow factory). Later the scheme was expanded to Blackpool, Manchester and Liverpool. To cope with the increase in output from these factories, provision had to be made for the aircraft to be held in reserve. This directly led to the setting up of Aircraft Storage Units (ASUs) on many of the new Flying Training Schools.

By the end of the year, Scheme 'H' was proposed which would have increased the front-line strength at the expense of the reserves but was soon rejected. Construction then began of the first ASUs.

In 1937 other new permanent RAF stations were planned under this scheme in Norfolk / Suffolk:

Honington	Wattisham	Watton	West Raynham.
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Between 1 May and 10 July 1936, the Air Council reviewed the system of command and administration prevailing in Home Commands. As a result ADGB, with its three sub-ordinates, (Western, Central and Fighting Areas), plus No.1 Air Defence Group, Coastal Area and Inland Area, were all disbanded. Instead, the first four new commands, each with an Air Officer Commanding-in-Chief were formed:

- Training Command formed out of the old Inland Area on 1 May 1936 – to control all training units at home including the RAF Reserve and Inspector of Civil Schools. Headquarters established at Buntingsdale Hall, Market Drayton
- Bomber Command formed on 10 July 1936 – controlling bomber squadrons and organised under a number of groups. Headquarters established at Hillingdon House, Uxbridge
- Fighter Command formed on 10 July 1936 – controlling fighter squadrons under a number of groups, Army Co-operation squadrons and the Royal Observer Corps. Headquarters established at Stanmore Park, London
- Coastal Command formed out of the old Coastal Area on 10 July 1936 – controlling flying boats and general reconnaissance squadrons, administration and shore training of the squadrons of Fleet Air Arm. Headquarters established at Lee-on-Solent.

2.2.4 Schemes 'L' and 'M'

Scheme 'J' would have given the RAF, by the summer of 1941, nearly 2,400 first-line aircraft, including 900 heavy bombers, but this would have entailed considerable financial expenditure which was unacceptable to the Government, who instructed the Air Ministry to prepare a cheaper version, which became Scheme 'K'.

Scheme 'K' came before the Cabinet in March 1938, but by this time the German move into Austria had occurred and it therefore became necessary for an accelerated programme. Scheme 'L' was the result, passed by the Cabinet on 27 April 1938 and this involved a programme of aircraft construction which represented the maximum output from industry within a two year period. However, long before the first year had passed, came the Munich crises and Scheme 'L' was replaced by Scheme 'M'. The latter was approved on 7 November 1938 for 2,550 first-line aircraft in the Metropolitan Air Force and scheduled to be completed by 31 March 1942.

There was only one new permanent Scheme 'M' station in the Norfolk / Suffolk region, at Swanton Morley. New nation-wide permanent RAF operational stations planned under Scheme 'L' are listed in Table 1 in Part 4 (p.40) which identifies 55 aircraft sheds on 13 sites. The protected version of the type 'C' hangar was also built on non-operational aircraft storage units and these figures have to be added to the list.

2.3 2013 Status

The situation in 2013, as regards the Scheme 'L' operational stations, is that out of 13 sites, only three are still RAF stations, another two are army barracks, three are civil airports and the rest are disused. Bramcote has lost all of its hangars and so has St Eval, while Wick has lost three of four and Kirton-in-Lindsey is under threat. This leaves 41 hangars extant (44 if you include Kirton-in-Lindsey).

Note that technically, the 'hangars' are aircraft sheds but for ease of reading 'hangars' is used throughout.

Part 3: Airfield Design and Construction

3.1 Introduction and Notes on Sources

This part first considers a site that was never actually built – at RAF Lawford which was planned and designed but rejected in favour of Coltishall. RAF Coltishall was constructed using money already allocated to Lawford. It is based on TNA files relating to works services at Coltishall, the Air Estimates, Secret Document 310, Sommerfeld track installation drawings, airfield site plans, The Civil Engineer in War, Volume 1: Airfields, Road and Bridges, the site plan for RAF Lawford as well as fieldwork.

3.2 Lawford or Coltishall

RAF Lawford (TM 09121 29688 – centre), named after Lawford House Farm, just north of Little Bromley near Colchester, Essex was planned originally to be built to drawing 5425/38 and then superseded by 67531/38 as a Scheme 'L' bomber station with six type 'C' hangars. The Treasury had agreed a sum, firstly of £500,000 and later of £736,000 for its construction, but at the last minute the Air Ministry decided that the additional cost of electric cable diversions would be prohibitive and the case was deferred in favour of Coltishall. The money that had been sanctioned by the treasury was therefore transferred and used for the purchase and construction of Coltishall instead. By 31 March 1939 the sum of £40,000 had already been spent at Coltishall; it was expected that a further £230,000 would be needed in the following financial year and £466,000 would be required to finish the project. RAF Lawford was never actually built, not even during the war as a temporary airfield which is very unusual. A further possible factor denying its development was that it would have resulted in the loss of five farms (Hollylodge, Rose, Grange, Lawford House and Riddlesdale Farms).

3.3 RAF Coltishall

In early July 1938, the proposed site for an airfield embraced the whole of Manor Farm (260 acres), Rookery Farm (72 acres), 100 acres of Colk's Farm and 105 acres of Malthouse Farm, but the actually acreage that was purchased in 1939 was reduced down to 529 acres. It did mean the total loss of the hamlet of Batley Green and the three tenant families there had to be moved out. The main contractor was Walter Lawrence Ltd of Swaffham along with many sub-contractors.

During October 1938, just three months after the treasury had sanctioned the purchase of Lawford, the site at Coltishall was in the process of being bought. Together with clearance rights, over another 102 acres to the north, north-east and south-west were needed, and including compensation for severance, tenant right and interference with sporting rights, this figure was estimated to be £40,000. Preparation of the aerodrome including removal of trees and hedges, the filling of depressions and grading etc was estimated to cost £12,000 – coincidentally the figure of £52,000 was the same as that agreed for Lawford which had been passed in the Supplementary Estimate of 11 July 1938. Furthermore, the figure of £40,000 that had been spent up to 31 March is the same as the estimate for land purchase.

3.4 Bomber to Fighter Station

Coltishall was selected as a site of an aerodrome for two bomber squadrons (sic) in the autumn of 1938 and the work of construction commenced in November of that year. The station becoming ready for occupation in July 1940 (but it was actually occupied in May whilst construction was still in progress).

It had been on 14 May 1937 that a major reorganisation of Fighter Command came into operation when Duxford, together with Church Fenton became part of a new 12 Group which had been formed to give air cover to the Midlands and northern part of England. Air Commodore Trafford Leigh-Mallory assumed command in December of that year. The group was then strengthened by the transfer of Wittering and Digby to become Sectors 'J' and 'K'.

In the aftermath of the Munich Crises, Leigh-Mallory wrote to HQ Fighter Command proposing two new forward sectors in Norfolk, based possibly at two new aerodromes being constructed at West Raynham and Horsham St Faith. Meanwhile Debden was transferred to 12 Group and on 25 October 1939, the unfinished station at Horsham St Faith was used as a forward base by 66 Squadron, who had been chosen for the trials of the new VHF radio sets. The East Anglian sector organisation was finally settled on 27 March 1940, when Sir Hugh Dowding agreed to a new Sector 'J', based on Coltishall. The old Sector 'J' based on Wittering became 'K' with a consequent adjustment of the other sectors to the west and north.

The bomber squadrons due to arrive at Coltishall were then transferred to a new aerodrome some 18 miles to the west at Swanton Morley which was due to be occupied at the end of the year.

It is interesting to note that Swanton Morley (a Scheme 'M' station) was designed from the beginning as a fighter station with three type 'J' hangars, but only one was actually built. This sole hangar in peace time would have been completely inadequate for two bomber squadrons while Coltishall was planned as a late Scheme 'L' bomber station, firstly with six, then five and later reduced to four type 'C' hangars which meant that as a two squadron single seater-fighter station, two hangars were surplus to requirements (in peace time). In wartime however, aircraft were dispersed around the airfield and not kept in hangars.

Furthermore, the fifth hangar would have been a bomber reserve shed to store aircraft held in stock prior to being allocated to a squadron. As the station was redesignated as a fighter station the fifth hangar was no longer required (WA7/Nor/1/40).

Bomb stores which were also completed prior to January 1940 were also surplus to the requirements of the fighter squadrons, but these were retained.

3.5 Access Road

In 1939, a grant of £2,087 was made to Norfolk County Council, representing one third of the estimated cost and the transfer of two acres of Air Ministry land (at a recoverable cost of £60) for the improvement (widening and strengthening) of the main B1150 approach road to RAF Coltishall.

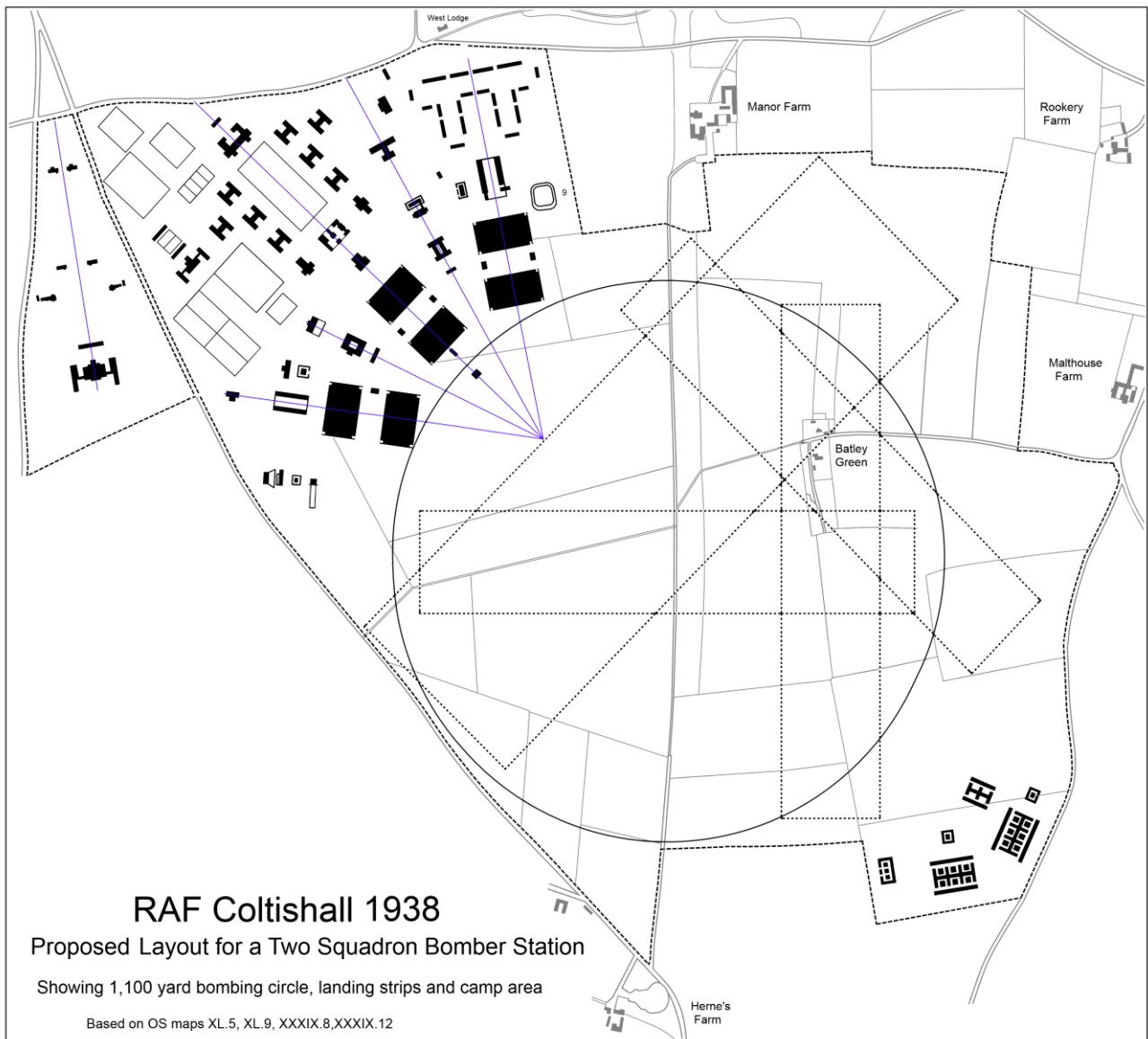


Fig 1: 1938 plan showing six type 'C' hangars

There is nothing unusual about this arrangement as, by 1938, heavy bomber stations were being designed with six hangars for three squadrons (the title of the original, as depicted in Fig.1, says 'two squadrons' but this is incorrect). In practice they only ever had a maximum of five; Horsham St Faith was exactly the same and ended up with five hangars – while in the next scheme, heavy bomber stations were built with just two (type 'J') out of six.

Note that the settings out lines shown are drawn at different angles from what was actually planned although the point of origin is in the correct place consequently the alignment of the buildings shown is different from that actually built. Furthermore, a few buildings like the sergeant's mess, the airmen's married quarters and the MT vehicle sheds are all shown in a completely different place from that which was actually built. The drawing number of this plan is unknown, but it was replaced with a new sequence of drawings 12387–91/38 which show the five hangars in the correct positions as drawn by J Binge. It is unknown why the setting out line angles were changed.

In 2013, the hamlet of Batley Green and Batley Green Lane exists on the ground as a crop mark and the best way to view it is on Google Earth. At ground level, there are depressions, large clusters of thistles and different species of grass in this area to the rest of the grass airfield. It is possible too (although not confirmed), that part of the metallised surface of the lane may be extant under the grass surface.



Fig 2: 1938 plan of Technical Site

1	Type 'C' Hangars	2	Watch Office	3	Fire Tender Garage
4	Lubricant & Inflammable Store	5	Parachute Store	6	Workshops
7	Main Stores	8	Petrol Tanker Sheds	9	Bulk Petrol Installation
10	MT Sheds	11	Sick Quarters	12	Works Services Building
13	Armoury	14	Central Heating Station	15	Engine Test Bed
16	Standby Set House	17	Fuel Store	18	MG Range
19	Practice Bomb Store & Gas Chamber	20	Group XII Store	21	MG Test Butts
22	Barrack Blocks	23	Ration Store	24	Dining Room & Institute
25	Flag Staff	26	Garages	27	Sergeants' Mess
28	Decontamination Centre	29	Gymnasium	30	Station HQ Offices
31	Guard House	32	Sergeants' Tennis Courts	33	Airmen's Tennis Courts
34	Married Airmen's Quarters	35	Married WOs' Quarters	36	Married Officers' Quarters Group V
37	Married Officers' Quarters Group IV	38	Married Officers' Quarters Group III	39	Married Officers' Quarters Group II
40	Officers' Mess & Single Officers' Quarters	41	Officers' Garages	42	Parade Ground
43	Rugby Pitch	44	Cricket Table	45	Soccer Pitch
46	Hockey Pitch	47	Cricket Practice Nets	48	Sports Pavilion
49	Incendiary Bomb Stores	50	Bomb Stores	51	Components Store
52	Fuzes Road Area	53	Families' Shop	54	Church



Plate 2: The airfield in May 1941

Photo: English Heritage (03887 of 28-05-41)

Note the following:

- The bomb stores have yet to be camouflaged
- The new concrete dispersal track but not for the south-east extension
- Only two runways have lighting (or so it appears, the straight lines being the cable trenches)
- The grass surface is painted to look similar to the pre-station field patterns
- It is just possible to make out that the perimeter track has been widened
- Aircraft are not using the blast pens which appear to be under construction (the rear walls are without earthwork traverses and are just concrete bagged walls). Aircraft are scattered around the airfield and there are no aircraft hardstandings present.



Plate 3: A similar view to above, taken in September 1941

Photo: English Heritage (A8N18 of 17-09-41)

Now note the following:

- The bomb stores are camouflaged with netting
- The new concrete dispersal tracks have been toned down as has the compass swinging circle
- The two runways are less obvious
- The aircraft pens to the south appear to be nearly finished.

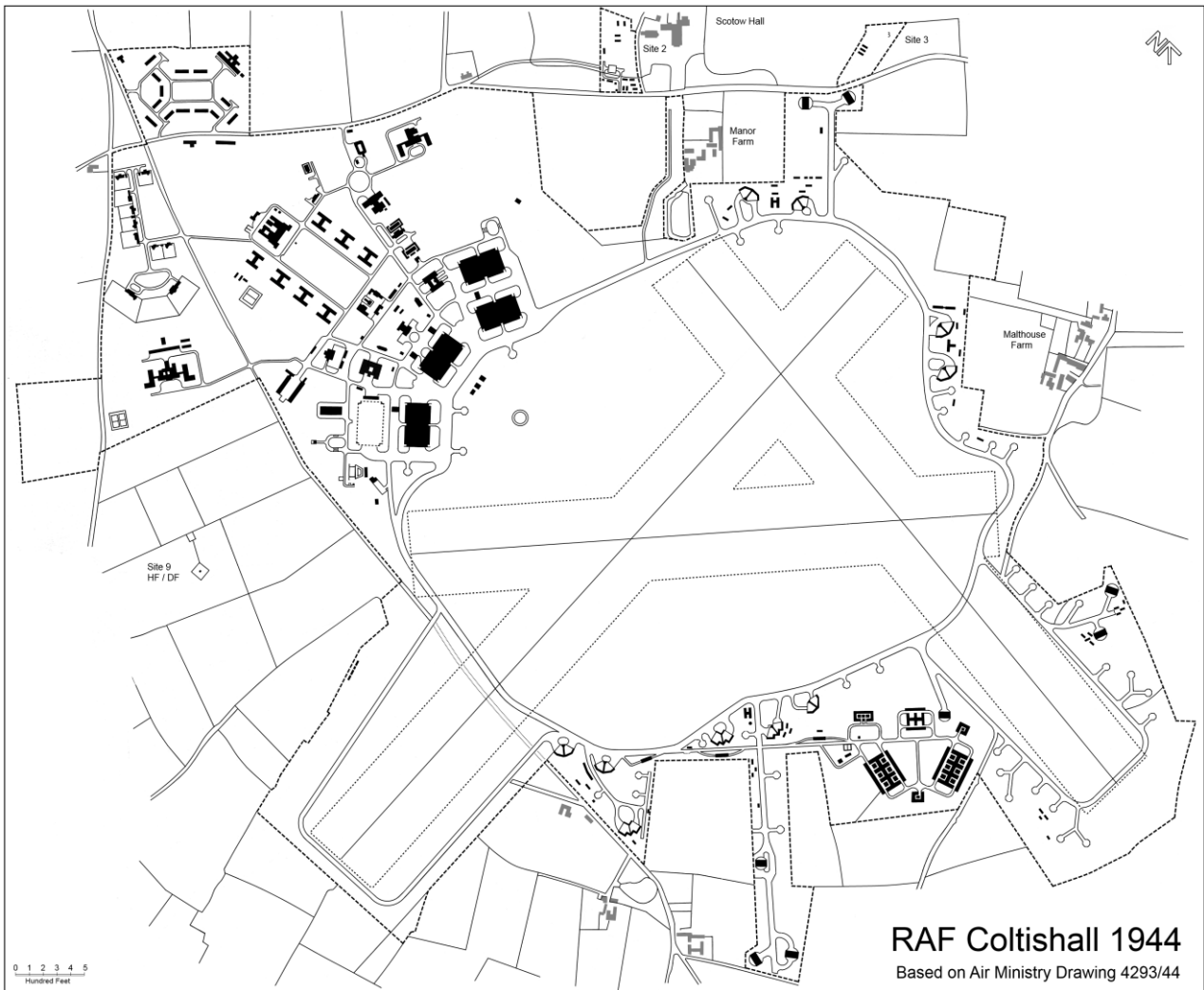


Fig 3: Site plan dated 1944

Note that the two fighter pens to the north-east of the site are missing – this is because they were built or partly built then removed as they were within the runway clearance zone. The plan is redrawn digitally, from an inaccurate original, and shows the stripping, not the actual runways which is surprising as the flare path lighting was in place as early as May 1941 on the main runway. It does however show the ultimate WWII layout with extensions, hardstandings and blister hangars.

3.6 Strips and Runways

3.6.1 Strips

As original planned, a 1,100 yard circular area was developed at the airfield, known as the bombing circle. Specified rectangular landing strips were planned across the circle in appropriate directions for taking off and landing with clearance zones at the ends for flightway approach, fanned at 15 degrees and a 1:15 glide angle from the airfield boundary.

Despite being a front-line Fighter Command airfield from its opening in 1940, Coltishall was never upgraded with hard runways during wartime, instead ending the war with two steel mesh runways and a third grass strip.

3.6.2 Perimeter Track

It was usual practice at a bomber station, to provide a 50-ft-wide perimeter track but as Coltishall had been redesignated as a fighter station, it was only necessary to have one 40 ft wide (a surviving portion of original

track was measured at just 33 ft between taxi track lights). It was probably originally only wide enough for vehicles – a contemporary aerial photo shows this – but by May 1941, it had been doubled in width to 40 ft.

Construction of the track is of concrete and a tone-down topping of asphalt; it is of roughly circular form around the airfield boundary, but had slight bulges to enable the four grass landing strips to be set up at appropriate length. Pre-war, each of the strips apart from the NE/SW one were 200 yards wide while the main one was 400 yards wide. The following lengths were available in 1940:

N/S: 3,900 ft NE/SW: 4,800 ft E/W: 3,900 ft SE/NW: 2,790 ft

Using evidence from old site plans and a photo dated 1942, the following is apparent:

- Around 1942, the north/south strip was abandoned and the NE/SW and SE/NW strips were extended lengthways c.1943
- Two fighter pens located at the northernmost point of the perimeter track infringed the clearance zone of two runways and these were demolished
- If there were any problems with the runways they would be repaired by day; aircraft took off to the right of the runway in use and by night the Drem Mk II runways were used in the normal way. These were marked out as specified runways delineated by the light fittings and consisted initially in 1941 of grass, later as Sommerfeld tracking, and later still as a combination of PSP and bar-and-rod and possibly Sommerfeld tracking, while one is thought to have stayed as grass
- Each runway is 150 ft wide and aligned on certain headings – one or more runways were equipped with permanent electric lighting by May 1941.

Drem lighting runway headings:

- 05/23 (NE/SW) 6,000 ft may have been part Sommerfeld track and part grass, later part bar and rod / PSP and grass or Sommerfeld track, removed Nov 1949 – Sep 1950
- 10/28 (E/W) 4,200 ft grass, disused from Sep 1950
- 15/33 (SE/NW) 4,800 ft part-Sommerfeld track and part-PSP, mainly removed Nov 1949 – Sep 1950

It is known from the ORB that during July 1943, Sommerfeld tracking was laid for 700 yards on the main flare path (05/23); work also started on laying tracking on the extension at the 05 end as well as the extension to 15/33 flare path at the 33 end.

Airfield engineers inspected the airfield surface in November 1944 and decided that bar-and-rod tracking in all touchdown areas and PSP in the centre covering bad patches. Two works flights were on hand to carry out this work.

3.6.3 Sommerfeld Track

Sommerfeld track was a light-weight metal track, designed by Kurt Joachim Sommerfeld of 'The Cedars', Cowley, Uxbridge, Middlesex in July 1940, and manufactured in the company works in Iver Lane, Cowley.

This light-weight track arrived at the airfield in rolls, 10 ft 7 in wide, each containing a 25 yard length of 3 in hexagonal-mesh wire netting of 12 or 13 gauge. When laid out, mild-steel rods of $\frac{3}{8}$ inch diameter were threaded transversely at 8 in centres through the wire netting. The ends of the rods were formed into loops so that 15-ft-long flat metal bars could be threaded through to join two lengths together. Slack was taken up by picketing one longitudinal edge with 3-ft-long angle-iron pickets and by attaching a large-tracked tractor to the opposite side by means of a yoke, to strain the track transversely with the tractor. The final instruction was to retain the track in its stretched position by picketing along this edge with angle-iron pickets. Today there are many of the pickets lying around the southern group of revetments and there are a number of rods half-buried in the region of the ready-use bomb stores.

3.6.4 Bar-and-Rod

Towards the end of WWII the main runway was relaid or partially laid in bar-and-rod and this was used up until the airfield closed for the construction of the new hard surface runway. It was then removed as there is no trace of it today. The system was not used on a large scale and there were two types, a light and a

heavy duty version. Both were of mild steel and were supplied in panels 12 feet by 3 feet wide, both types were similar in arrangement, except the lighter track used thinner cross-section material.

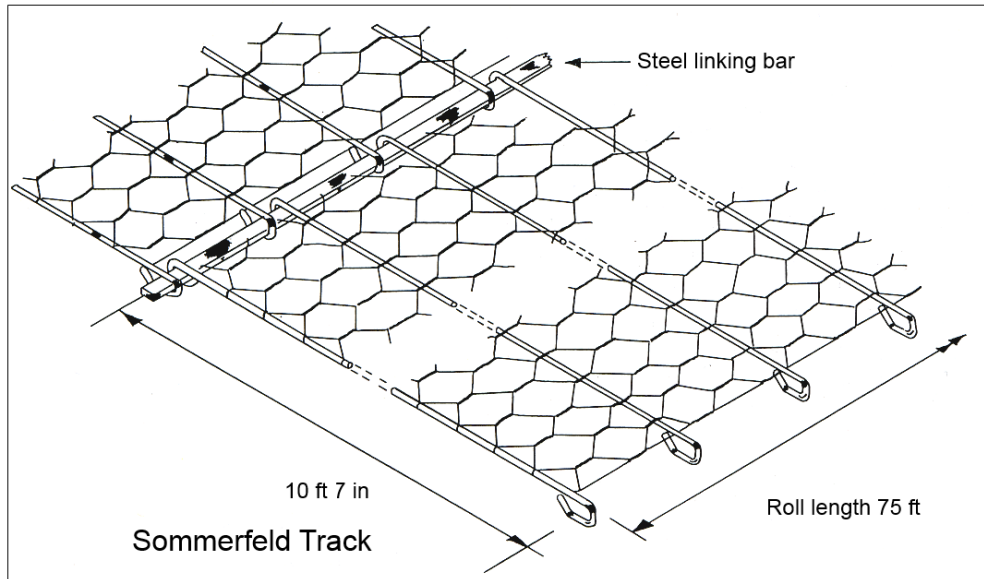


Fig 4: Sommerfeld tracking

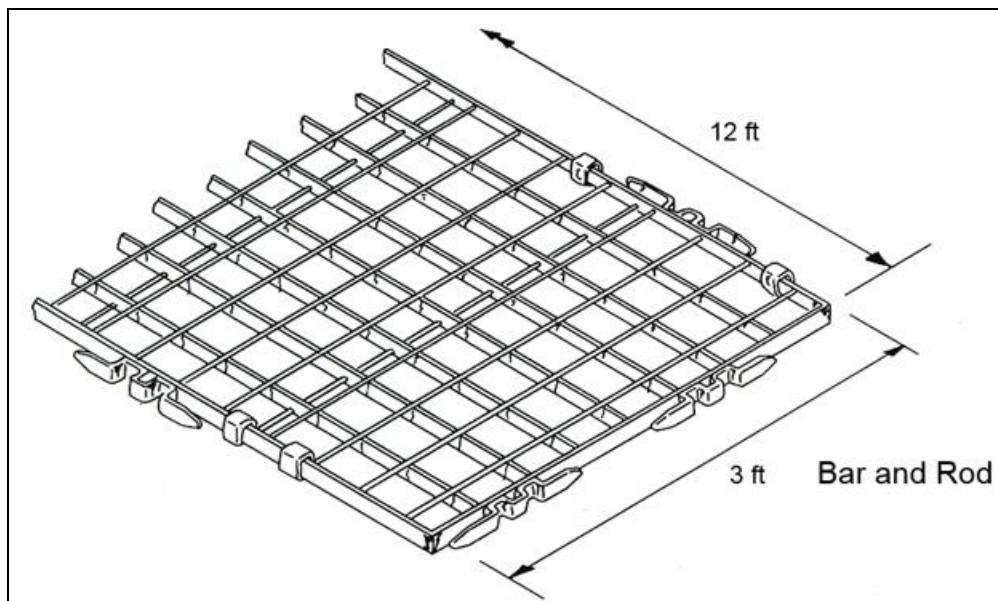


Fig 5: Bar-and-Rod track

3.6.5 Pierced Steel Plank

This track was developed in the United States prior to their entry into the war and was subsequently used far more widely than any other type British or American. It consists of panels or planks 1 ft 3 in wide by nearly 10 ft long, made from No.10 US sheet gauge mild steel plate. Longitudinal ribs are formed in the sheet to increase stiffness, and to reduce weight three parallel lines of 2½ inch diameter holes spaced at 4 in centres are punched out of the sheets on each side of the ribs. To obtain stiffness the holes are bent down. Side connections between planks are made by interlocking projecting lugs along the side of one plank with slots punched out of the side of the adjoining plank. Lugs and slots are provided along both edges of the planks. Spring steel clips are driven into the slots behind the lug projections to prevent the latter from slipping out. The planks are laid in rows parallel to the traverse centre-line of the runway and planks in successive rows are staggered by half a panel length. Each row of planks is laid with the lugs pointing in the opposite direction from those in an adjacent row.

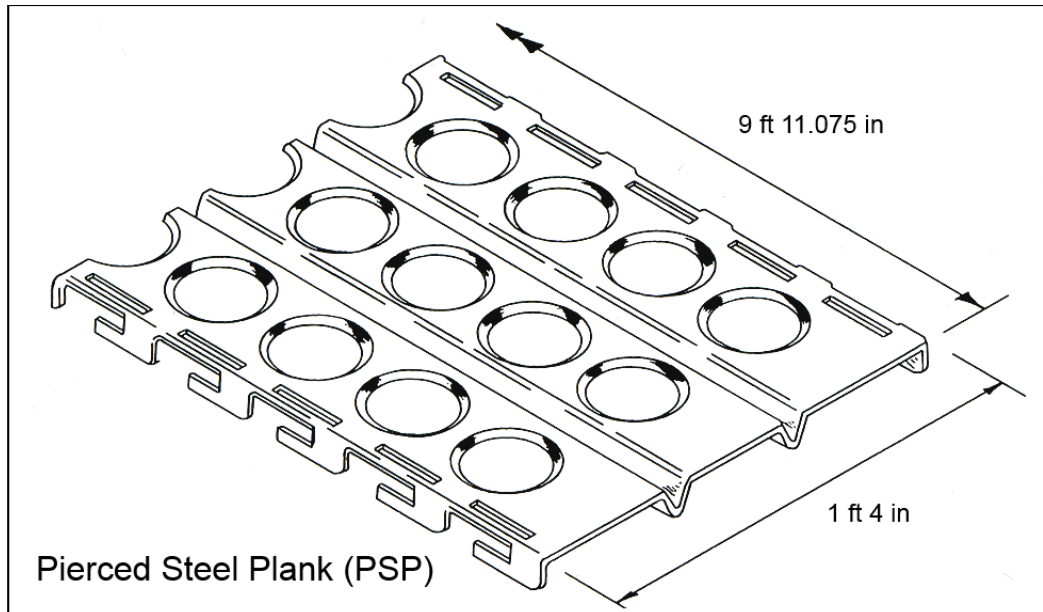


Fig 6: PSP track



Plate 4: PSP track underneath the grass surface adjacent to a Drem runway light

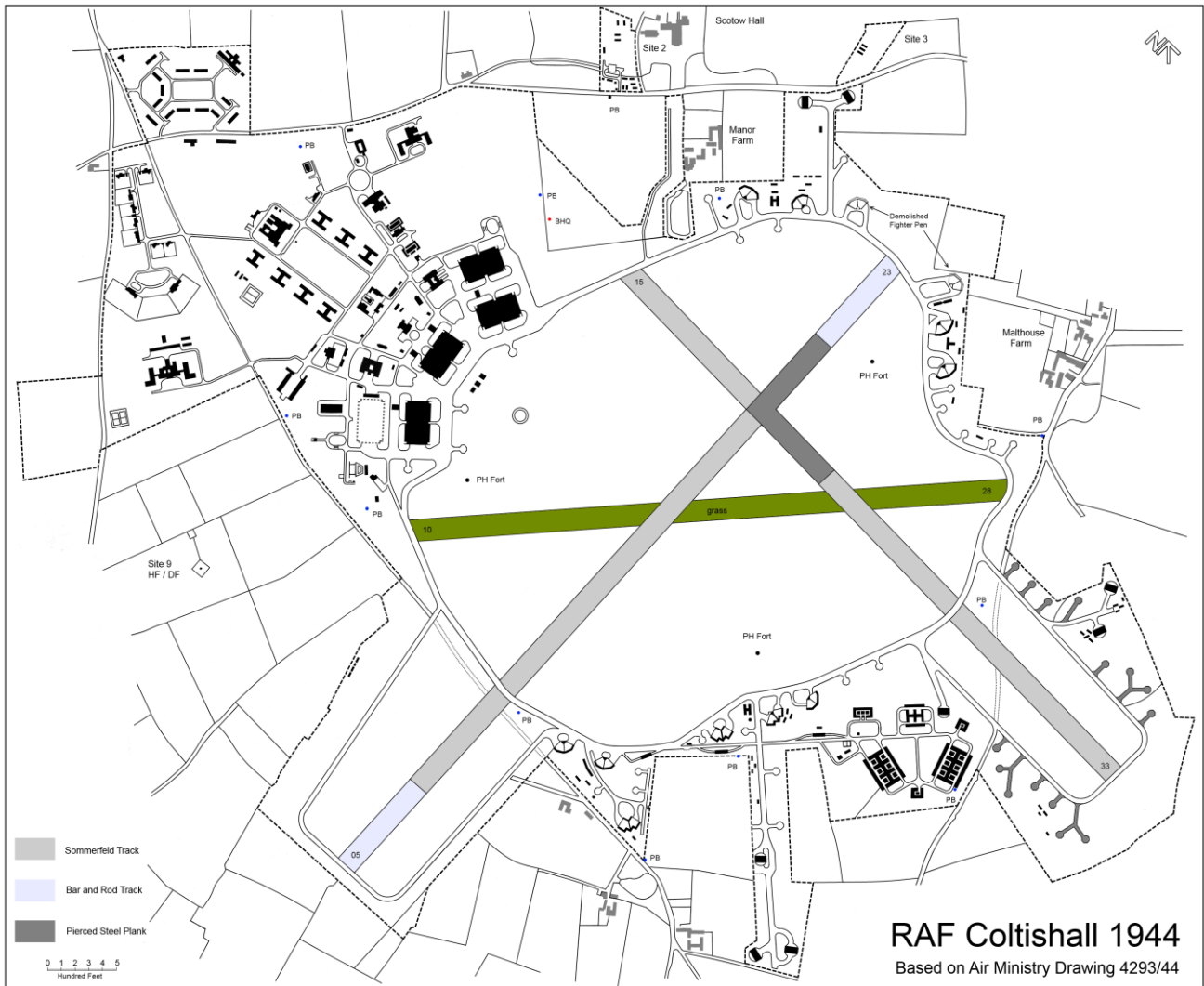


Fig 7: 1944 Layout

Going on the archaeology just below the surface and a small amount of primary source evidence, this plan is the probable 1944 runway arrangement though future discoveries either below the surface or in primary records, may dispute some of this. The PH fort close to the hangar line is the suggested position based on the English Heritage historical imagery.

3.7 Airfield Lighting

Permanent electric lighting began to be installed on UK military airfields in 1941, replacing paraffin flares which were in general use. The latter took a long time to set out when needed and importantly could not be extinguished in a hurry if the airfield came under attack. The first standardised electric system was based on a successful experimental design installed at Drem airfield in Scotland, which by the end of the year had been superseded by an improved version which became the standard throughout the conflict. Known officially as 'Airfield Lighting' (Mks.I and II) it was generally referred to as Drem.

As a night fighter station, Drem Mk II runway lighting had already been installed (although the number of runways having it pre-1942 is unknown). The lights post-1942 delineated the 150-ft-wide grass runway along the centre line of at least three of the strips. It is known that there was a flarepath in use in May 1941,

though this may have been a temporary one. The type C.6 runway marker lights were bidirectional flush cast iron fittings (12 by 8 inches) which were (in this case) fixed to 4 ft square concrete blocks alongside the runway edge. The upper contour is dome-shaped and a typical unit projects no more than 1.5 inches above the concrete level and is capable of withstanding being run over by the heaviest aircraft. These were laid down both sides of each runway dead opposite each other and spaced nominally at 300 ft apart longitudinally. Each fitting contained two light apertures with two pygmy well-glass fittings with flanged semi-circular metal reflectors to throw the light from the lamps through the apertures in the dome – only one of these would be lit at any one time.

Across the width of each runway at 800 yards distance from each end, cross bars of lights were installed to warn pilots of the extent of the runway still available and to mark the last safe point for touchdown. These cross bar fittings were unidirectional in light distribution, blue screened with one pygmy well glass fitting housed inside a small 8 inch diameter cast iron dome (type C.5). They were spaced across the runway at 37.5 feet apart, altogether seven in number for each set and were connected to the corresponding runway marker lights electrical circuit.

The perimeter track was fitted with a taxi track lighting system. The fittings are similar to the crossbar light fittings except that instead of only one light aperture, there are six spaced around the periphery of the circular cast iron dome. This permitted an all-round visibility from the ground. The fittings, known as T.1s, were installed either on the taxi track itself or on separate precast concrete mounting blocks placed alongside the perimeter track. They were provided on both sides of the perimeter track and on straight portions, being spaced at 150 yards apart. On curved portions the spacing was reduced to one quarter of the radius of the curve. They were fitted with amber screens on the outside edge of the perimeter track and blue on the inside edge.



Plate 5: Type C.6 flare path fitting



Plate 6: Type C.6 flare path light and concrete mounting plinth
One of the two well-glass lamp-holders has been separated



Plate 7: Type C.5 800-yard runway cross-bar light



Plate 8: Type T.1 taxi track light (damaged)



Plate 9: Type T.1 taxi track light (intact)

3.8 Aircraft Dispersals

Aircraft dispersals included 35 single-engine (SE) hardstandings, though some of these may have been for twin-engine aircraft; they are not circular, but multi-sided, (a typical hardstanding is 60 feet across flats). These were mainly constructed adjacent to the perimeter track. Each of these has a pair of metal tie-down rings at 20 ft centres. The original 22 were constructed of concrete slab toned down with tarmac and another 15 built around the runway '33' end extension were constructed with PSP. The majority face away from the landing ground, so as to be outside the runway clearance zones.



Plate 10: Typical WWII aircraft hardstanding

3.8.1 Summary of WWII Aircraft Hardstandings

For Single Engine Aircraft:

26759 23287	26855 23328	27245 22996	26962 23323 crop mark
27228 22955	27347 22867	27000 22342	27077 22371 crop mark
26484 22106	26583 22149	26583 22149	26719 22220 crop mark

For Twin Engine Aircraft:

26820 22234

(all NGRs are 'TG')



Plate 11: Aircraft tie-down ring



Plate 12: Fighter hardstanding

3.9 Fighter Pens

3.9.1 Two Styles of the Same Fighter Pen

Fighter pens, as shown on a site plan dated 1944, were of two different shapes, one for the Hurricane and the other for a Blenheim, but aerial photographs showing their construction between May and August 1941 indicate that they were all originally Hurricane types. These were the earlier type 'B' pens to drawing 11070/40, each for two single-engine aircraft with a dividing wall. They were constructed of sand and cement bagged walls with earthwork traverses around the rear walls and an air-raid shelter located at the front of the central arm. They are associated with flight offices, ablutions, sleeping shelters and air-raid shelters or trenches. The northern group were constructed first and the southern group between May and September 1941. After 1942, three pens had their outer arms removed and rebuilt creating a 'W' shape in plan to accommodate twin-engine aircraft.



Plate 13: A fighter pen under construction in May 1941

The concrete bagged walls are present but the earthwork traverses are yet to be added, as is the air-raid shelter, although the floor slab is present.



Plate 14: Group (flight) of three pens which are finished and in use (Sept 1931)



Plate 15: The only surviving twin-engine aircraft pen
The image clearly shows the 'W'-shape planform



Plate 16: The scheduled single-engine fighter pen (one half)



Plate 17: WWII era temporary brick store at front of the scheduled fighter pen

3.9.2 The scheduled fighter pen

The scheduled fighter pen is the best example of the two partially extant pens, being roughly 90% complete whereas the other pen is around 45% intact (it is difficult to ascertain what exactly remains as it is almost completely overgrown and difficult to get to). The front part of the pen included the site of the air-raid shelter was obliterated with the construction of the drop-tank storage area (220).

The scheduled pen's maximum width dimension is 65 ft, the wing span of a Hurricane is 40 ft and that of a Blenheim is 56 ft 4 in so the pen is definitely for a single-engine fighter and the tie-down rings are at 20 ft centres. The sandbagged walls were probably originally 8 ft high, but they now vary in height by nearly 2 ft in places. The rear walls at the ends have triangular-shaped sandbagged returns which are earth bank retaining walls – the earth covering is missing.

▫ NGR: Scheduled fighter pen: TG 26780 23406

The function of temporary brick building 93 at the front of the pen is unknown; this arrangement is unique to Coltishall, as a few of the other pens had this structure as well, in this exact position. There is single access, which used to be a double-width door beneath the concrete lintel but it has been replaced with another of single width and infilled in 9 in brick. The roof is corrugated asbestos sheeting fixed to steel purlins carried on internal brick piers.

▫ NGR: (93) TG 26773 23390

The air-raid shelter at the front of the pen and behind the temporary brick building is constructed of reinforced concrete with 13 in brick access points. It measures 7 ft by 15 ft and is within a sandbagged protected enclosure that is triangular-shaped in plan.

On the airfield side of the pen is a detached air-raid shelter 'P'.

▫ NGR: TG 26785 23369, non-scheduled pen: TG 26567 22030

3.10 Airfield Defence

3.10.1 Background

During the late summer of 1940, as part of an Air Ministry enquiry into formulating an airfield defence policy, an inspection was carried out at 41 RAF stations by Major General GBO Taylor (Inspector General of Fortifications at the War Office). During September 1940, Taylor's conclusions were published in a paper known as the 'Taylor Report' and this became the main guide for the planning of airfield defences. He divided his proposals into three main categories according to the likely scale of attack from German forces.

The three classes were as follows:

- Class I – airfields located within 20 miles of a port that could potentially be used by enemy parachutists who would capture the landing ground for use by their troop-carrying aircraft. They could then operate a shuttle-service to deliver large numbers of infantry. These men might then advance upon the nearby port, so that once captured it could then be used to off-load more troops and fighting vehicles
- Class II – airfields defined as those 'liable to intensive attack, but mainly confined to air and parachute attack'
- Class III – all remaining RAF airfields.

Class II airfields were further divided into:

- Class IIa – fighter and bomber stations that could be used for refuelling and re-arming RAF aircraft engaged in operations against positions of enemy forces
- Class IIb – stations within five miles of a vulnerable point such as an aircraft factory
- Class IIc – all aircraft storage units.

Coltishall was a Class I airfield and would in theory have been generously provided with a combination of light anti-aircraft defences and pillboxes (20 to 30 structures), plus dummies and including three Pickett-Hamilton forts. Class I stations were the only airfields to receive these under Taylor's plan.

3.10.2 Coltishall Defences

Access to the English Heritage photos has confirmed that there were at least twelve pillboxes existed and today four are extant while two of the three Pickett-Hamilton forts have been found. It has also confirmed that by September 1941, the airfield perimeter had been completely encircled with a series of discrete defended interlocking localities, defined by lines and entanglements of Dannert wire, turning the entire airfield into a fortified area. The defended localities out on the airfield would be protected by the station's army garrison and the camp site by station personnel.

It is known that an FW3 type 22 pillbox used to be located at TG 25984 22680, but this was demolished c.1973 during the construction of the Jaguar flight simulator building. It is thought that the bulk of the defences were LAA gun positions of which 23 are thought to have existed. At least two pillboxes and two LAA positions were destroyed when the 15/33 and 05/23 runways were extended.

Extant pillboxes NGRs – note that these do not have building numbers:

- TG 27460 22924 (Malthouse Farm / The Fairstead)
- TG 26824 22191 (south blister hangar track)
- TG 26000 21959 (north-west of Colk's Farm)
- TG 27287 22153 (bomb stores)

3.10.3 Pickett-Hamilton Fort

The original drawing for the fort is signed by its designer, Donald Hamilton of 17–19 Stratford Place, London on 11 June 1940 and the title of this drawing is 'Obstruction Defence Post'. It was adopted by the Air Ministry as drawing 13313/40, possibly with a few amendments, such as omitting a central beam underneath the roof of the lifting head and substituting this with a steel plate where the jack meets the concrete – the revised version being flat.

The fort consists of two concentric hollow spun-concrete drums, one inside the other, resting on a concrete and brick base, with the inner drum (lifting head) designed to be raised under pneumatic pressure from a compressed air bottle, or alternatively a hand-operated oil pump. When in the down position, the lifting head is flush with the ground surface, but when it is brought into operation in an emergency it could be raised to surprise an enemy invasion force. The lifting head could be raised 2 ft or so above the surface, where Lewis or Bren gun loopholes were situated. Access to the fort was via a hatch in the lid of the lifting head and a series of iron steps allowing two men to reach these embrasures. Normally three forts were provided at each location. Airfield site plans do not normally identify where these structure are located. There were three known types, designed and manufactured by different companies:

- A manually operated cantilever type which used a large concrete weight to balance the rising head in its open position (Worthy Down) – probably not a Pickett-Hamilton design
- A manually operated lifting and turning head (Middle Wallop) – probably not a Pickett-Hamilton design
- The much more common pneumatically-controlled / hydraulically and rising head version (Coltishall).

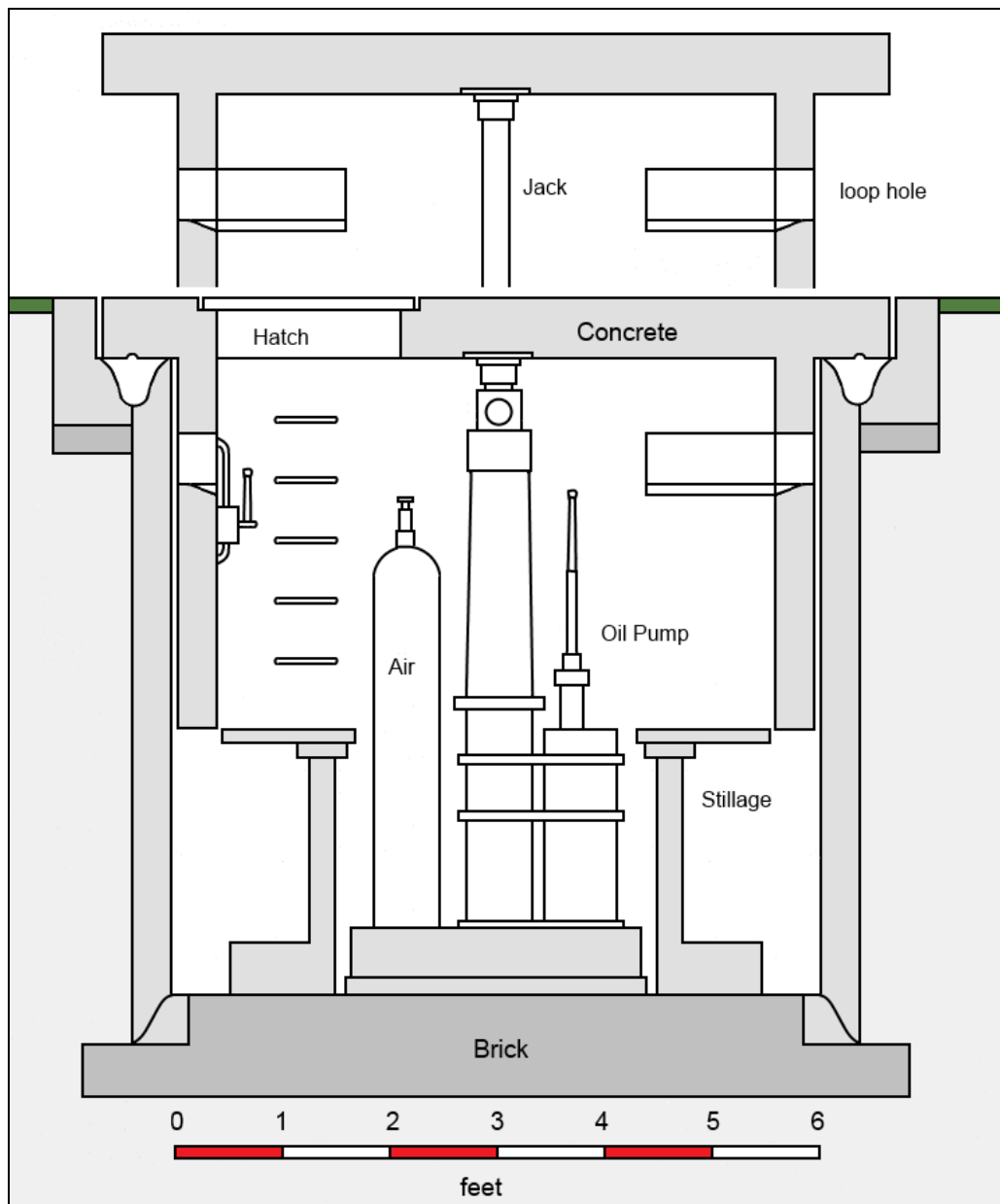


Fig 8: Diagram showing a section of the Pickett-Hamilton fort

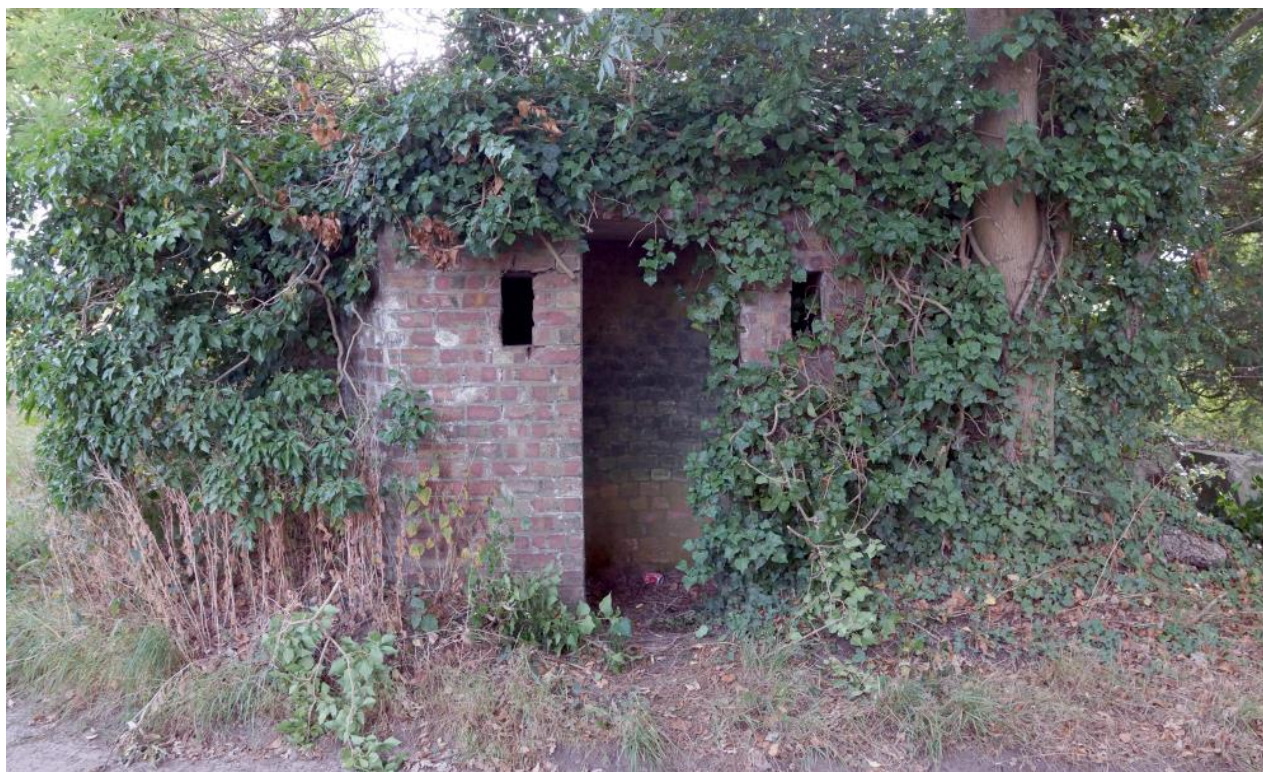


Plate 18: Small six-sided pillbox inward facing with camouflaged anti-ricochet wall
Location is north of Colk's Farm



Plate 19: Interior of rectangular-shaped with angled end walls pillbox
It is outward facing and the wall on the left is part of the entrance blast wall (south blister hangar track).



Plate 20: Pickett-Hamilton fort discovered 15 June 2013



Plate 21: Pickett-Hamilton fort discovered 16 July 2013



Plate 22: The main technical and domestic areas in May 1941

Note that the camouflage scheme is in place over most of the buildings except for the officer's mess.

The circle of white on the airfield in front of the watch office/hangars is the compass swinging circle.

The image shows a number of what appear to be defended localities consisting of pillboxes and light anti-aircraft gun positions which are protected with Dannert wire (shown as dark lines). One of these defended localities is just to the west of the officers' mess which has half a circle of Dannert wire around it, the wire then goes north forming the perimeter to the officers' married quarters and in an easterly direction to the south of the mess as it makes its way to another defended locality based on a pillbox to the west of building 14. There is a similar arrangement to the north of the sergeants' mess.

There is also a possible Bofors gun site to the north of the ration stores and all of these sites have been identified on this image in yellow.

It is exceedingly well defended.

(North is at the bottom.)



Plate 23: Interior of the pumped out Pickett-Hamilton fort
Note the bracket for supporting a machine-gun



Plate 24: Imperial War Museum photo showing a PH fort with Bren gun
Photo probably taken at the demonstration site at Langley airfield in 1940



Plate 25: Interior of rectangular-shaped pillbox inward facing with AA position in the roof
Location is at Malthouse Farm



Plate 26: Bomb crater
Many of the bomb craters show up on the ground as crop marks and depressions,
but the best way to view them is on Google Earth.

3.10.4 121 Battery War Diary

The first mention of Coltishall in the 121 Battery War Diary is the entry for 1 June 1940 when four Bofors arrived. The next entry is 27 October: air-raid by Dornier 215 and Heinkel 111. Machine gun posts 1–4 and 40 mm posts in action, M/G posts were machine gunned from plane, three bombs dropped no casualties. He111 crashed in sea at Bacton. No.121 Battery (341 Troop) was officially credited with its destruction by Fighter Command.

On 3 November 341 Troop exchanged with 338 Troop at Horsham St Faith.

3.10.5 Station Operations Record Book, References to Station Defence

Note: Included here are references to other stations that were under the care of RAF Coltishall.

1940

- 18–22 Jun: On the nights of 18, 19, 21 and 22 June Air-Raid Warnings were sounded. On the night of 21/22 June, 11 bombs were dropped on Swanton Abbot, 4 at Felmingham, 12 at Suffield and 2 at Worstead. The bombs all exploded in fields, and apart from one horse killed little damage was done. However it is interesting to note that the areas bombed are 2 to 3 miles distant from the aerodrome and the nights were moonlit.
- 8 July: Lt WJU Lawrence, Norfolk Regiment was attached at Coltishall for station defence.
- 19 Aug: A bombing raid was carried out by an enemy raider, who suddenly came through the clouds, dropped six bombs doing little damage to an unfinished hangar, but killing and injuring several workmen.†
- 7 Sep: During the night six or seven bombs were dropped near the dummy aerodrome.
- 27 Oct: At about 18.10 hours an enemy aircraft dropped bombs in the vicinity of the aerodrome. Another enemy aircraft machine-gunned defence post No.3 who opened fire with their Lewis guns. Enemy aircraft disappeared in very low cloud, but came down in the sea off Lowestoft. It has been confirmed that an He111 was destroyed by the ground defences at Coltishall. (Note: compare this account with the one at the top of the page.)
- 29 Oct: Matlask aerodrome was bombed and machine-gunned with no casualties but otherwise little damage.
- 1 Nov: Air Raid warning – two sticks of bombs dropped three miles north of the aerodrome.
- 5 Nov: A single enemy aircraft made a surprise attack on the station, machine gunning defence posts and workmen.
- 8 Nov: An enemy aircraft dropped 11 bombs on the aerodrome; one badly damaged the watch office, the remainder making small craters on the aerodrome which were quickly filled in.

1941

- 4 Feb: At about 01.00 hours an attack alarm was sounded but bombs were dropped some distance from the aerodrome.
- 11 Feb: At 00.15 hours whilst night flying was in progress enemy aircraft dropped about 50 incendiary bombs on aerodrome and between hangars but these were quickly put out. No damage was done and no bombs dropped. The e/a was attacked but no visible damage observed.
- 12 Feb: At 20.20 hours about 30–40 incendiary bombs were dropped on and around the aerodrome which were quickly extinguished without causing any damage.
- 4 May: At 0145 hours in bright moonlight, a JU88 passed over the aerodrome chased by Spitfires, P/O BP Klee and Sgt JH Burgess of 22 (Natal) Squadron. E/A dropped a stick of four explosive incendiary bombs on the NW boundary of the aerodrome. These were immediately extinguished and no damage was done. P/O BP Klee was shot down in flames just off the aerodrome.
- 5 May: At 00.10 hours an Air Attack Alarm was given; five minutes later seven HE bombs dropped on the waste ground between the officers' mess and Block 5. There were six casualties, one dead, two seriously wounded and three minor. All clear at 00.50 hours. Another Air Attack Alarm was sounded at 01.30 hours but no bombs were dropped.

† The Commonwealth War Graves Register for civilians killed during WWII identifies the following that were killed at Scottow (sic) Aerodrome: Lawrence Wilfred Stone, age 31, husband of Laura AM Stone, of Church Cottages, Horstead. George Middleton, age 32, son of Harriet Middleton of White Horse St, Wymondham. Sidney Alexander, age 55, son of Robert and Martha Rix, of 19 Salford St, Heigham and husband of Maud Rix of Fairviews, Shorthorne Rd, Stratton Strawless.

- 8 May: (a): At 23.20 hours, seven HE bombs were dropped between south dispersal and watch office causing slight damage to the flare path which was quickly repaired.
- 8 May: (b): At 02.30 hours, four small bombs were dropped on the 'Q' Site. The only damage was to one electric cable and was immediately repaired.
- 12 May: Attack Alarm was sounded at 00.35, all clear at 01.16 hours, no bombs dropped. At 00.25 hours about 80 explosive / incendiary bombs were dropped on the airfield at Matlask and about 100 in adjoining fields. No damage or casualties.
- 20 Aug: Four 500 lb (at least) bombs in camp (sic) at 21.45 hours, no damage to personnel or property.
- 8 Sep: Five separate sticks of bombs within 10 miles, between 10.40 and 00.22 hours. Bombs in the vicinity at 22.22 and 01.10 hours.
- 11 Sep: Four bombs dropped at Colts (sic) Farm, access to camp shortly after midnight, no one hurt.
- 22 Nov: Army Exercise 'Samson' commenced and was completed the following day.
- 29 Nov: The Drem 'Q' Site was brought into operation.
- 18 Dec: Two armoured piercing bombs dropped at G8448 at 08.15 hours less than a mile SE of CHL (chain home low) – a direct hit on the 7th Norfolk mess. Two ORs killed and one officer and six ORs in hospital. The Ju88 approached below cliff level – crater 3 feet deep by 15 feet across.

1942

- 6 Feb: A Dornier 217 with grey underneath and black uppers passed the southern side of the aerodrome plainly visible, at about 180 mph at 1,800 feet. No action as no fighters in the vicinity and 41st Brigade advise that their guns at sites L2, L4 and L6 state that it was out of range.
- 29/30 Apr: About 30 enemy aircraft made a concentrated attack on Norwich between 23.19 and 23.55 hours, the bombing and dive-bombing was indiscriminate and from all heights. Most of the e/a approached from the north (several passing over Coltishall), and departed to the south. Many fires were started in the city and suburbs. Following are some of the landmarks reported bombed or burnt out: Hippodrome, Woolworths, St Benedict's Church, Caley's Chocolate Factory, Howlett & White's Shoes and Clark's Boot Factory. Fires were still burning in the centre of the city at 08.00 hours.
- . Four Beaufighters of 63 Squadron were airborne during the attack, having taken off 22.20 and 22.28 hours. P/O Paton had three contacts on an enemy aircraft but nothing further. S/Ldr Howden had two contacts on one e/a, followed by a contact on a second, resulting on a visual and a combat, from which he claims one Heinkel III damaged. G/Capt Lees took off in a Spitfire at 23.26 and W/Cdr Hanks at 23.31 hours. W/Cdr Hanks claims a Do 217 probably destroyed, another damaged and another Do 217 destroyed shared with Coltishall ground defences.
- 19 Oct: Three enemy aircraft, taking advantage of very low cloud over East Anglia, crossed the coast at 07.00 hours. Attack alarm on camp was raised 15 minutes later and a Dornier was seen to pass over the south of the aerodrome. It returned or maybe another raid, also low over the officers' mess at 08.25 hours. Another passed over the watch office in cloud at 400 feet and emerged at 200 feet over the married quarters clearly distinguishable as a Do217.
- 23 Oct: A Stirling was homed by searchlights and landed after operations against Italy – this entry confirms that Coltishall had a Sandra capability. Three sites 'A' to 'C' but locations unknown.
- 2 Nov: Movement of RAF Regiment. No.2719 Squadron marched out to Collyweston (Wittering) and was replaced by 2781 Squadron from Collyweston.

1943

- Jun: A new operations room was opened on 24 June involving largely increased communication facilities. At this time, an ops PBX was also brought into use in the old building at the rear of the SHQ and this was taken over by the Bofors defence crews (the main circuits duplicated those in the battle headquarters), thus rendering the system of operational communications more flexible. The changeover from emergency operations room (Catton) to the main operations room (Camp 'O' at Stratton Strawless Hall) was carried out successfully and without hindrance. The defence communications on Coltishall has been completely reorganised. The perimeter cable was connected up and comms laid to all defence posts, Bofors gun sites, canopy gun sites and light anti-aircraft gun sites.

- 3–10 Jul: No.2812 Squadron RAF Regiment took over operations, manning and control of the Bofors guns; they replaced 2811, who moved away from the sector on 15 July. No.2812 had only just reorganised itself from a Field unit to an LAA unit, it was divided into flights specialising in certain weapons, carrying out training on Bofors, Hispano and Browning guns on the range at Stiffkey and ground instruction at Filey. On 12 April, they assumed control of eight twin Browning gun posts at Coltishall. After completing their training the Bofors Flight took over (on loan) the operational commitment from 'A' Troop, 457 Battery, 140 Regiment, Royal Artillery at Coltishall of the four gun sites
- Aug: All ground defence weapons were removed from Ludham and Matlask, and Ludham was handed over to the AMWD while Matlask was put on a care and maintenance basis. No.2812 Squadron, RAF Regiment left the station for Holmsley South taking with them all four of Coltishall's Bofors guns. No.2885 Squadron arrived at Coltishall from Drem to take over the station's Browning machine gun posts (all Lewis and Vickers guns had been replaced by Brownings before December 1943) and 2803 Squadron arrived from Acklington equipped with four Bofors guns.
- 23 Aug: Attack Alarm sounded in the early hours – three bombs dropped on the aerodrome.
- 27 Sep: A Halifax crash landed at 00.35 hours, it had been on a bombing run on Hanover; during the return two of its engines packed up and it landed with its undercarriage up at the end of the runway. No sooner had it landed when three HE were dropped on the airfield rupturing the Sommerfeld track and three canisters of 2 kg anti-personnel bombs were dropped around the eastern perimeter. Two fighters then landed and the airfield was declared unserviceable. A bomb disposal squad blew up the bombs and the craters were filled.
- 16 Oct: No.2885 Squadron left the station for North Luffenham; they were replaced with 2735 Squadron from Snailwell.

1944

- Oct: The 'Q' Sites at Beeston St Lawrence and Suffield were dismantled.

3.11 Dispersed Sites

There were nine numbered dispersed sites, plus two others, mostly located to the west. The army sites are for the army defence guard and the units that manned the LAA guns:

Site #	Function	Bldg numbers / notes
2	Airmen's Domestic Site	(201 to 216)
3	Army Domestic Site	(222 to 230)
4	Army Domestic Site	(230 to 233)
5	Army Domestic Site	(239 to 242)
6	?	(248 to 252) This site may not have been built
7	Gymnasium & Chancel	(253)
8	VHF D/F Site	(259 to 260)
9	HF D/F Site	(263)
10	Sewage Disposal Works	(266-271)
?	VHF Receiving Station	at Brookpark Plantation: building and two 90 ft masts
?	Receiving Station	south of St Michael's Church: rest hut and two 90 ft masts
Note that the building numbers listed are those that represent actual buildings (with the exception of Site 6). Most of these sites had a series of other building numbers allocated to them but these were not used. Site No.7 still retains its wartime gymnasium at TG 24809 23075		



Plate 27: Gymnasium building on Site 7

3.12 Air-Raid Shelters

Apart from basement refuges, beneath the officers' mess, sergeants' mess and the barrack blocks, there were two types of air-raid shelter – both were underground. One consisted of a trench shelter which was probably an earth trench with a timber frame and clad with corrugated iron, having a floor of duckboards, a roof of corrugated iron and covered with earth. These were 'W'-shaped and were placed mainly around the domestic buildings. None of these are extant in 2013.

The other type is a monolithic concrete shelter accessed from a flight of brick steps leading to a rectangular-shaped single shelter with an emergency exit at the opposite end with a vertical ladder. This shaft would have originally had a patent cast-iron cover but only one is extant, the others being replaced with covers fabricated from aluminium sheet. They were used post war and had telephone communication with the GDOC (32). The shelters have an internal measurement of 7 ft by 30 ft.



Plate 28: Air-raid shelter 'E' (513) showing an original escape cover



Plate 29: Interior view of shelter (517)

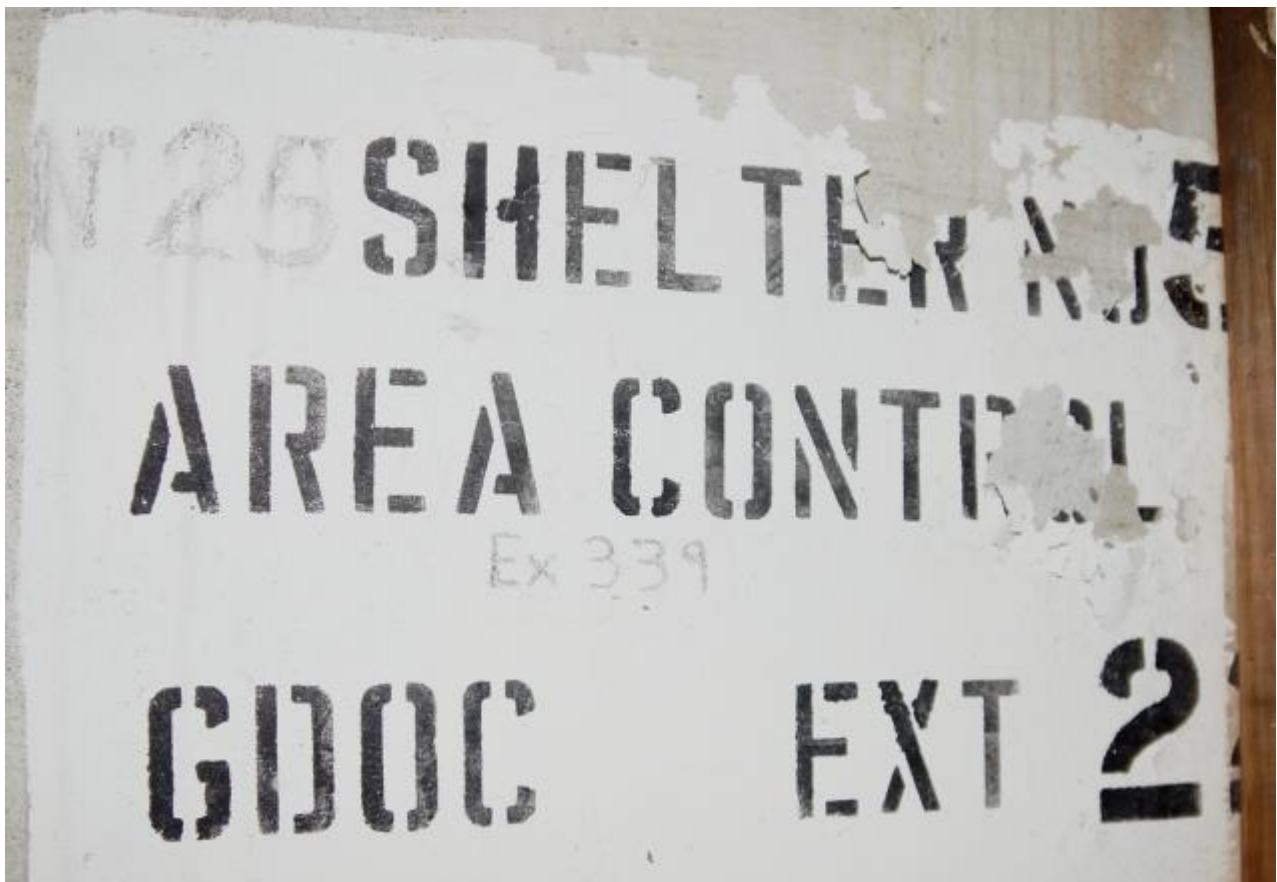


Plate 30: Signage (thought to be post-war) in shelter (517)



Plate 31: Close-up aerial view of the main domestic area

Photo: English Heritage (03879 of 28-05-41).

The buildings are displaying camouflage on their flat concrete roofs, but their poor colouring, shadows and new concrete paths give them away.

Note the 'W'-shaped trench shelters and what might be light anti-aircraft or ground defence positions in front of the SHQ (35) on the roundabout and another to the left of the central barrack block close to the left-hand edge of the image.

There is an extensive cluster of defence posts to the north of the ration store close to the top edge of the image.

Note that the image has been rotated and that north is at the top of the right-hand corner.

Part 4: Station Buildings – Planning and Construction, 1938–45

4.1 Introduction and Notes on Sources

This is an overview of the planning of the buildings and construction, concentrating on Scheme 'L' designs, it is based on original Air Ministry site and building plans plus TNA Air Ministry (AIR) files.

4.2 Building Costs

The first group of six 'L' Scheme operational bomber stations (which included Horsham St Faith) to be built in permanent construction had been approved by the treasury on 26 August 1938 and detailed works services had been submitted by the Air Ministry on 14 October. The names of the next group of 'L' Scheme stations, consisting of three airfields also in permanent construction, were submitted to the treasury on 10 November 1938 for approval.

Table1: Scheme 'L' Operational Stations

Airfield	Cost £thousand	Date opened	Type	Group	Acres as in 1940	Hangars
Binbrook	749	26-06-40	Bomber	1	514	5C
Bramcote	772	04-06-40	Bomber	6	?	5C
Coltishall	736	00-05-40	Bomber*	12	534	4C
Leeming	761	03-06-40	Bomber	4	875	5C
Lindholme	732	03-06-40	Bomber	5	428	5C
Middle Wallop	735	16-04-40	Bomber*		569	5C
Newton	751	03-06-40	Bomber	1	509	5C
Horsham St Faith	742	04-06-40	Bomber	2	461	5C
Kirton-in-Lindsey	?	14-04-40	Fighter	12	352	3C (smaller version)
St Eval**	?	02-10-39	Coastal	10	?	3C, 1 Bellman
Topcliffe	750	00-09-40	Bomber	7	?	5C
Wick	?	22-09-39	Coastal	13	?	4C, 2 Bellman
Middleton St George	?	00-04-41	Bomber	4	591	1C, 1J

*Planned as a bomber station but used by fighters. **The St Eval hangars were non-protected

Table2: Building Cost for Binbrook, Bramcote and Coltishall – November 1938

Building	£	Building	£
Officers' Mess & Quarters	40,000	Sergeants' Mess & Quarters	20,000
Barracks	63,000	Dining Room & Institute	26,000
Sick Quarters & Mortuary	3,800	Decontamination Centre, Gas Defence Centre & SSQ Annexe	13,050
Guardhouse	4,000	Hangars (5 'C' type)	202,500
Armoury	5,500	Bomb Stores (144 tons)	25,000
MG Range & Test Butt	3,000	Workshops & Engine Test House	7,800
Main Stores	7,500	Subsidiary Stores	4,000
MT, Fire Tender & Fuel Tanker Sheds	14,800	Station Offices & Operations Block	12,500
Works Services Accommodation	15,600	Petrol & Oil Storage	15,000
W/T Station & Masts	5,600	Standby Set House	2,000
H/F / D/F Station	1,100	Practice Bomb Store	400
Minor Services	1,300	1 Group II Officers' MQ	4,100
1 Group III Officers' MQ	3,600	2 Group IV Officers' MQ	5,200
7 Group V	14,700	1 Warrant Officer's MQ	915
68 type 'B' Airmen's MQ	40,800	Recreational Facilities	1,850
Electrical & Mechanical Services	37,000	Drains, Water Supply, Roads, Paths, Fencing & Sewage Works	92,000
Contingencies	30,385		

Details regarding the costs of buildings to be built at the first six sites are unknown, but that for the next group of bomber stations (Binbrook, Bramcote and Coltishall) was the same regardless of site, as were electrical services, drains, water supply roads, paths fencing and sewage disposal. Where they differed considerably, was the preparation of the aerodrome surface, with Coltishall coming out the cheapest at £12,000. Bramcote was next at £18,500 and Binbrook at £25,000. Bramcote had an additional cost of £30,000 for the diversion of overhead electric cables which is bizarre as this was the reason that Lawford was dropped in favour of Coltishall.

4.3 Type Designs

The planning of the pre-war stations was achieved by using a system of standardised type designs for buildings which gave them uniformity and character. Although many of these originated during 1934 to 1936 under Schemes 'A'; and 'C', (such as the main stores, petrol tanker sheds, parachute store and main workshops), some of the Coltishall buildings are 1938 versions of the earlier designs whereby certain modifications have come about due to making them less vulnerable to near-miss bomb blast and for better protection against incendiary bombs with the use of patent fireproof roofs for example.

The requirements of both 'L' and 'M' Schemes also called for large increases in accommodation at existing as well as on the new stations. Under Scheme 'L', new buildings were required to cater for the increased scale of personnel to be accommodated. These included new a new type of barrack block, a combined dining room and institute and a sergeants' mess, all of which were connected to a centralised district heating scheme and fed from a modern boiler house instead of each building having its own boiler room. Another priority included the construction of facilities to safeguard personnel from the effects of gas weapons. This was mainly in the form of protected decontamination centres and a similar structure in the form of an annexe attached to the station sick quarters. Personnel who were just suffering from the effects of gas (unwounded) or had conventional wounds as well (wounded) could be treated. Air-raid shelters were constructed under Scheme 'M'. A major and significant change took place under these two schemes with the redesign of the (new) type 'C' aeroplane shed under Scheme 'L' and later Scheme 'M'; its subsequent replacement with a totally different design – the type 'J'. Furthermore, the watch office was significantly redesigned for the newly formed military regional control organisation of air traffic control.

Generally each building would have a set of plans, each having a unique reference number, such as the barrack blocks type 8/84 to drawing 1132/38 of 1938. The plans might be for architectural / general arrangement, deviations, superseding drawings, electrical and mechanical (M&E) and heating and ventilation (H&V) layouts.

The planning of the station and its infrastructure originated more or less from one design authority – the Air Ministry Works Directorate (AMWD) and its team of architects, civil engineers, M&E engineers, surveyors and lands officers. Most architectural design drawings of the expansion period were signed by either Archibald Bulloch (1934–35), PM Stratton, A Gilpin, AA Clements or JW Binge. A few of these personalities stayed with the AMWD post-war and went on to design new buildings (central armoury) and adapt existing buildings at Coltishall (such as the main stores).

Not only were the buildings standardised, but also the position of buildings in relation to each other; this was particularly important with regards to technical buildings and their locations regarding the hangars they served. A visiting pilot would be familiar with the layout of any expansion period station regardless of whether he had been there or not. This reduced stress and saved time in getting to the right place on the camp in the shortest possible time. Only the domestic buildings were modified slightly to suit the local geography, the position of the officers' mess for example, which is always south-facing and overlooking open countryside.

4.4 Technical and Domestic Accommodation Planning

RAF Coltishall is nominally symmetrical and planned around an upside down 'Y' with the tail of the 'Y' aligned on a NW/SE axis. The positions of the majority of pre-war buildings at Coltishall has been planned around a number of setting out lines, worked out from an origin out on the airfield, with the watch office, a hangar, armoury, works services building, parade ground and combined dining room and institute forming the central line. The positions of other buildings follow similar lines at various angles radiating out from the origin. There are two main groups – a technical group which is planned around a shallow arch or crescent that is dominated by the hangars facing onto the landing ground (the crescent-shaped hangar line is concave to follow the line of the imaginary bombing circle). Another reason is passive defence, whereby straight lines of buildings are wherever possible avoided.

The other group consists of the airmen's domestic buildings which are positioned further north-west and behind the technical area. These are arranged around a rectangular-shaped parade ground with two parallel 12-ft-wide roads forming the tail of the 'Y' while the crescent main roads are 18 ft wide.

The final setting out plans for Coltishall are 12386–12391/38, and other known drawing numbers associated with station planning with regards to roads, paths and buildings are 2315–2322/39 and 5561–5563/39.

The site for the officers' mess, single quarters and married quarters conveniently occupies a north/south aligned triangular-shaped site that was partly formed by public roads with the mess building positioned at the southern end and married quarters positioned behind it to the north.

The south facing sergeants' mess is behind the guard and fire party house to the north-west and the airmen's married quarters is located north of the main site.

4.5 WWII Buildings

The majority of buildings constructed during WWII were temporary brick huts, permanent brick buildings, timber huts and Nissen huts. The majority of these were built around the airfield in support of airfield defence, the fighter pens and a group of buildings representing a flight. The only structures from this period that survive today are permanent brick buildings, notably three sleeping shelters. These structures became redundant at the end of WWII and consequently they do not have current building numbers.

4.5.1 Sleeping Shelters

Two of these (132 and 135), are 33 and 18-man versions (respectively) and are very difficult to find, being located on the other side of Heras fencing at the extreme west boundary line and almost completely hidden from view by trees and bushes. These are associated with a pair of fighter pens which are now foundation and crop marks as well as a wartime mechanical and electrical plinth plus one other building, but these could not be seen. The other sleeping shelter (170), an 18-man version, is easier to find as it is within the fenced boundary but is difficult to access and photograph – it is associated with a Blenheim fighter pen. They are permanent brick-built (13 in external walls) and a concrete slab roof of rectangular form with an entrance at either end which is an external blackout porch. They have a central corridor with bunks arranged in tiers on either side – the 33-man version is subdivided into three compartments by brick walls with doorways. They are windowless but vented with high-level ventilation fans, one on either end wall. Today they are minus their bunks, building 132 retaining its ventilator fans.

Sleeping shelters NGRs – note that building numbers are as at 1944 shown on drawing 4293/44

- (132) TG 27268 23169 (135), TG 27261 23091 (170), TG 26563 22011

4.5.2 Other WWII buildings

There is an extant ammunition store (170) in the hedge line on private land located on the extreme southern end of the surviving track that used to connect Frogge Lane with Scottow Hall at approximately TG 26605 2216. Other buildings that may date from WWII but are not identified on the 1944 site plan relate to mechanical and electrical (M&E) plinths at the following locations:

- TG 26863 22203 (building identified in 2000 as 338)
- TG 27113 23043 (building identified in 2000 as 341)
- TG 26862 22203 (building with no number)

The latter building is an open brick-walled compound with internal dimensions of 13 ft 10 in by 14 ft 9 in. One wall is part of a building which has two rooms (12 ft by 11 ft and 10 ft by 11 ft). These have below-floor conduit pits. It is windowless but vented top and bottom. The roof is a concrete slab.



Plate 32: Interior view of sleeping shelter 135



Plate 33: Interior view of sleeping shelters 171



Plate 34: Electrical sub-station (no building number)



Plate 35: This presumed to be an airfield lighting M&E plinth (338)



Plate 36: Aerial view of the main camp area, taken in May 1945

Note that the image has been rotated and that north is at the top right-hand corner.

Photo: English Heritage (03879 of 28-05-41)



Plate 37: Barrack blocks c.1951.



Plate 38: Station headquarters c.1951.

Photos: AHB



Plate 39: Interior of combined institute and dining room



Plate 40: Officers MQ c.1951

Photos: AHB

Part 5: Fighter Command Airfield Development, 1946–60

5.1 Introduction and Notes on Sources

This part is an overview of Fighter Command's post-war strategy for airfield development and how it affected fighter stations, particularly in East Anglia – Coltishall and West Raynham were both very significant in this respect. It is based on research carried out at The National Archives by ARG member Peter Howarth and it is an extract of a part-work which was published as in Airfield Review a few years ago.

5.2 Background

By VJ-Day on 14 August 1945, the RAF had just three operational units of Gloster Meteor F.3 jet fighters: 616 Sqn at Lübeck in Germany, and 74 and 245 Sqns at Colerne. In addition, 1335 Conversion Unit had recently been formed at Molesworth to adapt pilots to the new type. At this time, little thought had been given to the requirements relating to airfields in order to accommodate the new jets. This was to change over the next few years as an increasing number of squadrons converted to both the Meteor and the de Havilland Vampire, whilst a plethora of new Air Ministry specifications harnessing both the new technology and German research into high speed flight encouraged the development of faster and heavier fighters.

Co-incident with this, the armed forces were shrinking from their wartime strength to one more appropriate to their new role of defending the hard-won peace. Taking the RAF as an example, from its peak of 504 squadrons on 1 January 1945, it had reduced to 479 by VE-Day (8 May 1945); it then was further reduced to 397 by VJ-Day and stood at just 249 squadrons by the end of the year.

Commensurate with this was a requirement to reduce the number of airfields, both in the UK and abroad. Even before the end of the war, the Post-War Airfield Requirements Committee met on a regular basis in order to discuss the disposal or retention of all UK airfields. By September 1946 their requirements for the post-war RAF had settled at 180 airfields and 6 flying boat bases. These were to be selected by meeting at least one of the following criteria:

- Very Heavy Bomber bases (e.g. Lakenheath, Marham etc)
- Airfields equipped with FIDO (Fog, Intensive Dispersal of)
- Pre-war permanent airfields (i.e. Expansion period)
- Those suited to modern aircraft by either having existing long runways that could be strengthened or the space for runways to be extended.

By 1 January 1946, many of the temporary wartime airfields had closed, Fighter Command's structure had been rationalised and many surplus squadrons, particularly those assigned to foreign and Dominion air forces (i.e. 300 and 400 series), had been disbanded or transferred to the home country.

The airfield selection process outlined above carried on, and in October 1946 the requirements for Fighter Command under what was known as Plan 'D' settled on 15 squadrons in 11 Group, 10 squadrons in 12 Group, an Armament Practice School (APS), the Central Fighter Establishment (CFE) and two Operational Conversion Units. No.13 Group had been merged into No.12 Group on 20 May.

The Royal Auxiliary Air Force (RAuxAF) was reformed on 10 May 1946 and the squadrons were allocated to Fighter Command, boosting the numbers involved. By 1st July 1948, Fighter Command had 13 squadrons plus 7 RAuxAF in 11 Group and 10 squadrons plus 12 RAuxAF, 2 OCUs and the CFE in 13 Group.

At this point there had been little effort to cater for jet aircraft within the existing operational airfields and certainly no attempt had been made to standardise on requirements. From 5 to 10 July 1948, the first meeting of the Airfield Standardisation Co-ordinating Committee took place. This body contained representatives from the RAF, USAF and RCAF and attempted to agree common airfield standards. Sub-committees met to discuss radio and radar, explosives storage, airfield lighting, fuel storage, domestic accommodation and hangars, ground communications and anti-aircraft defence.

Two more meetings were held in April 1949 and January 1950 but little consensus resulted.

The RAF then gave their first thoughts on fighter airfield requirements. These were as follows:

- Runway length 6,000 ft for fighters with a maximum weight of 65,000 lbs
- Taxiways 50 ft wide
- Cleared zone 600 ft each side of the runway centreline, 1,000 ft clear at each end
- Glide path 1:50.

At the same time, correspondence was taking place between Fighter Command and the Air Ministry Directorate of Air Policy (D.Pol(AS)) on the subject of runways for RAuxAF airfields. D.Pol(AS) stated that the main runway for Vampires should be at least 1,800 yards whilst a secondary runway of 1,400 yards was not acceptable. For Meteors, the main runway should be between 1,800 and 2,000 yards in length. Fighter Command accepted the recommendation for the main runway but stated that a second runway was needed to ensure maximum effectiveness.

Issues were being reported with the deterioration of runways, particularly at the ends where the aircraft were held at full power on the brakes prior to commencing take-off. The Vampire was deemed to be the worst culprit due to the angle and distance from the ground of the jet pipe. They asked for concrete slabbing at the end of each runway to counteract this and the first airfield so equipped was West Malling which had the work completed in September 1948, coinciding with the conversion of 500 Sqn to Meteors.

5.3 The Rebuilding Programme Begins

Five fighter airfields were initially identified as requiring urgent upgrades, including Coltishall, Duxford, and Wattisham in East Anglia. They all had Pierced Steel Planking (PSP) or steel matting main runways which were completely inadequate for the new aircraft and clearance was given in April 1949 to start the rebuilding programme.

The specification for the rebuild was still not formulated but the following layout was suggested:

- Runways: Main – 2,000 yards × 50 yards constructed of concrete. An 04/22 orientation was determined to be the optimum for UK conditions but the only RAF-operated fighter station that actually met this criteria in East Anglia was Coltishall. Others were:

Duxford: 06/24	Horsham St Faith: 09/27	Marham: 06/24 and 29/11
Stradishall: 07/25	Wattisham: 06/24	West Raynham: 03/21

- Secondary: Single cross-runway of 1,600 yards recommended. Alternatively build a parallel runway or use a satellite airfield
- Dispersals: To be built at ends of runways to cater for four squadrons of 12 aircraft each, although concerns were raised about presenting a concentrated target to the enemy. Normal dispersals were also needed for spare aircraft and second line maintenance
- Control tower: A combined airfield and approach control building was to be located away from the main technical site
- Refuelling: Tankers were to be used rather than piped supplies to dispersals.

All new construction would cater for aircraft weights of up to 30,000 lbs and the runways were needed to be in service by 31 March 1950 at the latest. A concrete running-up platform adjacent to the hangars would be needed and bulk fuel storage was to be investigated as it was felt to be inadequate at all three stations, with three times the current storage volume being proposed. Decisions were made regarding the new runways at the airfields:

- Coltishall: The southernmost of the two proposed parallel runways was to be built
- Duxford: The new runway was to be to the north of the existing PSP runway although road closures may be needed
- Wattisham: Extending the existing E/W runway was investigated but this had many disadvantages. Therefore it was agreed to go with a main runway in the NE/SW orientation, to drawing 1502/49. Wattisham's 32 existing hardstandings were deemed to be sufficient, but those at the other airfields were still under review.

5.4 Enter the Central Flying School

Senior officers within the CFE at West Raynham had been monitoring developments and at this stage became involved, at the request of Fighter Command, in putting forward their ideas for the upgraded airfields. They had already voiced their approval to the standard 2,000 yard × 50 yard main runway, with 1,000 yard overshoots at each end and 50 yards clear to each side. On 10 May 1949 they held a site conference to discuss aircraft hardstandings. It was agreed that, where present, the existing PSP hardstandings, fitted as stopgaps in front of hangars to prevent grass being scorched and the aircraft sinking in, were not suitable and should be replaced by concrete. Some science was applied to the size of these, resulting in the following formulae:

- Width = (75 per cent of station establishment) × (wingspan + 6 ft)
- Depth = (2 × wingspan) + (1 × length) + (1 × bowser width) + 15 per cent

Assuming a station contained 74 Meteors, this would give a hardstanding of 2,700 ft wide by 150 ft deep, a huge area. Ideally it should be located outside the sterile area, i.e. outside the perimeter track. The size and location were not practical and so the first one built, at West Raynham itself, measured 420 ft by 150 ft and was located on the runway side of the perimeter track. These were to be called Aircraft Servicing Platforms (ASP). The basic definition of the ASP was contained in drawing FCW/31/49, later to be taken on by the Air Ministry as 2278/49.

A further meeting took place on 21 June between the CFE and the Air Ministry. Details on some of the key design features were discussed and it was agreed that the ASPs should be tailored to suit the available space, as per West Raynham, although it was desirable to be able to cater for 24 aircraft (two 16 aircraft squadrons at 75 per cent strength).

Furthermore, the first thoughts on what was initially known as a War Readiness Platform (WRP) at the ends of the runways were laid down. These were proposed to be an angled hardstanding capable of holding a single squadron. Separate shelters for each aircraft were to be provided, these being in the form of a 70 ft span blister hangar made from 3 inch thick concrete. This initial scheme was followed by one showing a dome-roofed circular shelter with internal blast walls, capable of holding six aircraft. By August, drawing FCW/65/49 was showing a large 700-ft-long cone-shaped piece of concrete to be located at the each end of the main runway. Drawing FCW/66/49 showed a similar arrangement, tailored to a possible upgrade to Horsham St Faith. In all cases fuel was to be piped underground to the WRP, and thence to each shelter by flexible hose. Each WRP would also have crew rooms and offices.

There were some disagreements at the meeting. CFE wanted dispersed maintenance around the airfield, whilst the Air Ministry wanted it centralised at the traditional technical site. The CFE wanted Calvert crossbar runway approach lighting, whilst the Air Ministry preferred sodium straight line. The CFE also wanted flying control dispersed, with runway caravans and an offsite underground control room.

By the end of July, Fighter Command had decided that the ASPs for Duxford and Coltishall were to be sited near the existing hangars, one each side of the watch office. Further consideration was needed on Wattisham but its existing facilities were inadequate and two 12-aircraft ASPs would be required. It was also decided that the existing bulk fuel storage capacity was adequate and the specification for taxiways was agreed. The final runway design for Wattisham was approved, to drawing 2082/49, and its ASP was defined by drawing 1502/49. All runways were to have the final 250 yds at each end in concrete to increase the resistance to jet blast.

Airfield Lighting - To resolve issues related to lighting, the Air Ministry held a meeting on 8 July. The following specification was proposed:

- Runway: Edge of runway – C.11 GEC fully adjustable, high-intensity, flush, bidirectional lights, at 80 ft spacing
- Parallel strip: 25 yds from runway edge – C.12 or C.3b low intensity flush lights, at 400 ft spacing
- Threshold: C.11 green lights across the 50 yd runway at 12.5 ft spacing
- Distance Marker Lights: Bars of C.11 yellow lights at 12.5 ft spacing, 800 yds from runway end

- Taxiway: T.2 lights at 160 ft spacing on straight sections, and spaced at an eighth of the corner radius on the bends
- Approach Lighting: To be determined.

Later in the month, AOC Fighter Command decided that approach lighting was to be high intensity, of either the new Calvert line and cross bar or the American slope-line type. It was desirable to use the latest Airfield Lighting Mk.6 runway lighting system. By the end of the year the Calvert approach lighting system was chosen (see section 5.10) and it was recommended that this be fitted at the following airfields in East Anglia:

Coltishall	Horsham St Faith	Stradishall	Wattisham.
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5.5 Work Commences

Despite large elements of the airfield upgrade design being at best ill-defined, rebuilding work on the three airfields started at Wattisham in July 1949, followed by Duxford in October and Coltishall in November.

Slowly, the design definitions were resolved. The western ASP at Duxford was relocated to allow an extra 100 ft between the hangars and the revised taxiway, whilst the eastern ASP was moved eastwards by 150 ft. The original ASP design (to drawing 2278/49) had grass islands between individual hardstandings, rather as per the later V-bomber dispersal design. One additional T2 hangar was to be erected at Duxford due to the limited space within the WWI-era general service sheds, whilst a 2.5 ft hump in the Wattisham runway was to be removed. By August, after one month, the Wattisham work was already behind schedule!

The cost estimates for the work at the end of August were:

Wattisham, £582,000	Duxford, £482,000	Coltishall, £585,000
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By October these had been reduced to £436,000, £414,000 and £439,000 respectively, primarily by reducing the amount of technical and domestic site work, at which point the plans were officially approved, despite work having already started.

The CFE were recommending one hangar per squadron as a minimum requirement and by November the term Operational Readiness Platform (ORP) was being used within Fighter Command for the WRPs. A memo from Air Officer Commanding (AOC) Fighter Command suggested that these features be installed at Wattisham only so that their effectiveness could be assessed.

On 16 January 1950, AOC Fighter Command published his thoughts on the optimum layout for a fighter airfield:

- Runways: Two parallel strips, 2,000 × 50 yds, 100 yds apart. One subsidiary runway of 1,600 yds at right angles to these
- ORP: Facility for 12 aircraft with 52 ft span at the end of each runway. Blast walls to be added in wartime. Construct at Duxford, Coltishall and Wattisham first
- ATC: Dispersed and concealed, with a runway controller caravan on a hardstanding to the left of each runway
- Landing Aids: Ground Controlled Approach (GCA) radar on each main runway
- Fuel: Four bulk fuel installations, supplied via separate roads
- Hangars - Servicing hangars to cater for 25 per cent of the station's strength. Individual aircraft hangars for 1st line maintenance
- Dispersals: Sufficient for all the station's complement
- Operations Rooms: Wing Ops Room to be well protected. Squadron Ops Room to be mobile.

As will be seen, many of these ideas came to nothing, primarily due to cost. The idea of blast walls on ORPs was soon dismissed, whilst the size of the ORPs was reduced to cater for six aircraft only, starting with those on the first three airfields. However one month later this decision was reversed, with each ORP to cater for

12 Meteor F.4 aircraft. A final design was agreed with the Air Ministry at a meeting at Waterbeach in May and drawing 1825/50 was created to define these.

Further details on plans for ATC facilities were published on 14 March 1950, although these would be too late to affect the immediate plans for Duxford, Coltishall and Wattisham.

In June it was recommended that all fighter aircraft be dispersed and serviced at those dispersals. The assumption was made that each airfield would have two squadrons of 16 aircraft each. Electrical power was required at both the dispersals and the 'marshalling areas' (ORPs) at the ends of the runway. Normal requirements were 28V DC 300A, with a peak current of 850A needed for heating the Airborne Interception (AI) radar of night fighters. Although underground supplies were proposed, it was also recommended that trailer-borne secondary power equipment be provided at the two locations for maximum flexibility. It was also calculated that two squadrons of Meteors would require 144,000 gallons of fuel per week, with storage to match.

As well as trying to cater for the new jet fighters, Fighter Command was also thinking about the next generation of jets, particularly the F.4/48 (Javelin) and F.23/49 (Lightning). For the latter in particular, it could be seen that longer runways may be needed, up to 7,500 ft, as well as the use of parachutes, arrester gear or high friction surfaces. Even further ahead, the Air Standardisation Coordinating Committee could foresee runways up to 9,000 ft in length, 200 ft wide and with 75-ft-wide perimeter tracks.

In the end though development levelled off after the Lightning and so the more extreme rebuilding plans were shelved.

5.6 Works Services Programme, 1950/51

On 23 August 1950, HQ Fighter Command published its proposed works programme for the East Anglian region forthcoming year.

Station	Task	Completion
Coltishall	Cross bar lighting (additional to current work)	October 1950
Duxford	New runway, taxiway and hardstanding improvements, ASP, ORP	May 1951
	Additional T2 hangar	October 1951
Great Massingham	Cross bar lighting.	
Horsham St Faith	2 ASPs, ORP (to drawing FCW/141/50)	April 1951
Waterbeach	2 ASPs, ORP (to drawing FCW/140/50)	April 1951
Wattisham	Cross bar lighting, rehabilitate two hangars (Nos. 2 and 3 type 'C' hangars had been bombed in 1940 and laid derelict ever since)	October 1950
West Raynham	3 ASPs (to drawing 2291/49)	April 1951

As can be seen, this was a large programme to be completed in a very short timescale. Changes in the programme were continual. By the end of September, two ORPs had been added to the requirements for West Raynham. Small runway extensions were to be added at Horsham St Faith and Waterbeach although Waterbeach had lost its extension by the end of November! However, the overall plan for ORP and ASP construction was approved on 29 November.

The first of the three initial airfields was returned to service when Coltishall accepted 23 Squadron and 141 Squadron in September 1950, ironically still equipped with Mosquitoes. However the work was still to be finished as the perimeter track and new dispersals were incomplete. Wattisham recommenced operations in October 1950 when two squadrons of Meteors arrived, whilst Duxford was not completed until August 1951.

5.7 Control Tower Upgrades

At the time of the civil engineering work to Coltishall, Duxford and Wattisham, these airfields were making do with their WWII (or before) control towers and equipment. The first improvement was the introduction of a Unit Control System. This was a method of controlling runway lighting with more variation available than with the existing Drem controllers, whilst certain interlock safeguards could be incorporated via switchgear such that certain lights could only be illuminated if other lights were already switched on.

The control panel was located with the Flying Control Officer (FCO) in the first floor control room. A dedicated room in the tower, known as the 'A' Centre, was required to house the electrical translation and distribution equipment and was always located on the ground floor. An associated medium voltage switchgear room was also required. The first such system had been installed at Heathrow in 1946.

Wartime Drem lighting, operating under blackout conditions, was relatively low power which meant that cables could be run directly from the control tower's switchroom to the various elements of the system. Modern runway and approach lighting used substantially more power and hence had to be supplied 'locally' from transformer and control enclosures out on the airfield itself. These were known as 'B' centres.

At Duxford (tower type 12779/41) and Wattisham (modified 207/36), the 'A' centre and medium voltage switchgear room were to be converted from the met office and duty pilot's rest room on the ground floor, with the met office moving to the front room on that floor. These modifications were covered by drawing 281/51. At Coltishall (2328/39), the new equipment was to be installed in the old teleprinter and forecast room to drawing 278/51.

With the provision of aircraft on standby on the ORPs, the question of alerting them to scramble was raised. The solution was the tele-scramble system, whereby the command from the station operations room was fed via underground cable to a terminal box at the ORP. From here, umbilical leads fed to each aircraft. The FCO was also patched in to the system and gave the final permission for take-off. The first set of equipment was installed at Wattisham in 1951 followed by the other key fighter stations.

5.8 Operational Readiness Platforms

As already seen, the concept of an ORP was that it provided an area of hardstanding where a number of fighters could be lined up at the end of a runway, armed, fuelled and ready for take-off, had been developed through 1949, with major inputs from Fighter Command and the CFE. By the end of 1950 this had matured into a length of concrete, 600 ft long by 150 ft wide, with an angled lead-in to the runway. One was to be positioned at each end of the main runway, preferably on the same side. The platform was designed to cater for 12 Meteor aircraft and allowed for 6 ft between wing tips. From February 1954, having both ORPs on the same side of the runway was standardised. The logic for this was that it left the grass area on the other side of the runway free for wheels-up landings or left space for a clearance zone between two parallel runways.

In later RAF layout specifications, the official description became:

Specially prepared areas at each end and immediately adjacent to one side of a runway on which aircraft may be assembled, either for rapid 'scrambling' or for final flight preparation.

As already seen, electrical power was fed to the ORPs to allow aircraft systems to be ground checked and kept on standby. However, plans to pipe fuel to the hardstandings were dropped and aircraft normally sat fully fuelled, topped up from bowsers as required.

Although there were several detail variations, the main drawing number for ORPs was 2196/51. They also became standard at most Royal Auxiliary Air Force airfields and some Flying Training Command airfields.

5.9 Aircraft Servicing Platforms

The official description of the ASP was:

Paved areas provided for the centralised servicing and turnround of aircraft. They will be provided in accordance with scales agreed between the Air Ministry and the Command concerned.

As described above, there was initially much debate as to their size and number. The first was built at West Raynham for the CFE, but this was relatively small, being 420 ft by 150 ft and catering for 8 aircraft only. This did however set the pattern by being adjacent to the hangars, but on the opposite side of the taxiway. Whilst a basic rectangular planform was desirable, some were curved to match the taxiway profile, for example at Leeming. Numbers installed varied from one to three per airfield, usually driven by the hangar layouts. Some early examples had grass 'islands' at each end, in effect providing an access taxiway to the rear of each ASP. These islands had a 20 ft. wide concrete strip in the middle for storing ground equipment. These features were later abandoned (as happened later at Coltishall) though, AOC Fighter Command disparagingly describing them as circular flower beds, and all later ASPs were solid concrete, normally formed from 10 ft square slabs.

By 1952 the space requirement per aircraft had been standardised and two specifications were defined. The type 'A' ASP catered for all-weather aircraft and allowed a width of 60 ft and a depth of 200 ft per aircraft. Each ASP had a clear zone of 70 ft at each end. The type 'B' ASP catered for short-range day fighters and allowed a width of 45 ft and a depth of 190 ft per aircraft. The depths were determined on the basis of the length of the fighter type plus a 50 ft taxiway at the rear and safety zones front and rear. Both types were available in standard lengths, normally catering for 8, 12 or 16 aircraft. Nevertheless this was only rigidly implemented at certain airfields and for most airfields the constraints of available space and taxiway shape determined the final size and profile.



Plate 41: Venom on Coltishall's northern ASP starting c.1951



Plate 42: Meteor NF11 landing at Coltishall c.1951.

Photos AHB

5.10 Runway Approach Lighting

By the end of 1949, it had been decided to standardise on the Calvert lighting system, although it would take some time before this was implemented at all Fighter Command airfields. The system was developed by Ted S Calvert at RAE Farnborough and consisted of a line of 500 Watt lamps extending from the end of the runway on its centreline, every 100 ft, for a distance of 3,500 ft. The first 1,000 ft from the runway had a single lamp, the next 1,000 ft had a double row of lamps, and the final 1,500 ft had three lamps side by side.

At 500 ft from the runway end was a cross-bar of 10, 140 Watt lamps, 105 ft long. This was repeated every 500 ft, but the cross-bars got progressively wider with subsequent bars having 14, 18, 28, 32, 36 and 40 lamps. The effect of this was to describe a triangle with an included angle of 4 degrees, focussed on a point 1,000 ft along the runway. As well as providing a tunnel to the end of the runway, the system also featured 'roll guidance' which allowed the pilot to assess his bank angle and make a judgement as to his glide slope.

This arrangement was confined to the main runway only and normally in the instrument landing direction only. All other active runways had simple centreline lighting. Some concerns were raised about the presence of elevated lights in the runway overshoot areas and it was agreed in October 1951 to install the lights at ground level for the first 1,000 ft. from the end of the runway.

5.11 Runway and Taxiway Lighting

Initial Air Ministry thoughts on runway lighting have been described earlier. Further consideration was given to the style and type of runway lighting required and trials were carried out at RAF Gütersloh from 12 to 15 December 1950, with further trials from 26 to 28 February 1951, particularly looking at the possible use of high-intensity lights. Two operational requirements were generated as a result of this: OR.830 for elevated high-intensity lights and OR.880 for a flush version, both of which would be required for the 1953/54 works programme.

In March 1951 the following specification was published for airfield lighting upgrades:

- Instrument runways: Where Mk.2 lighting fitted, apply high-intensity lights every 100 ft
- Where Contact or Contact and Mk.2 lighting fitted, apply high-intensity lights every 200 ft in one direction only, all other lights to be C.11
- At runway intersections, flush lights to be used
- At ORPs, elevated lights to illuminate them every 200 ft
- Subsidiary runways: Replace all lights with T.2 type
- Threshold Green bars consisting of flush lights at 12.5 ft intervals across the width
- Distance Marker at 800 yds from upwind end, at 12.5 ft spacing
- Taxi track. Replace all lights with T.2 type, at 160 ft intervals
- All lights to be capable of being dimmed at various preset levels.

Based on early experience at Coltishall and Wattisham, ASP lights were changed from blue to amber in November 1951, whilst green threshold lights were confirmed in October 1952. Meanwhile, the relative merits of elevated and flush lighting were being debated. Developments were led by Bomber Command as they were planning a series of wider runways for which there was some concern as to whether the existing runway edge lights were visible enough during take-off and landing.

Holophane Ltd developed their LR/21 semi-recessed light fitting to OR.880 and a trial installation was carried out at Honington in 1955 for a centre-line lighting system using green lights at 100 ft intervals. Following the completion of bomber trials, on 2 December the CFE was requested to carry out trials using Hunter aircraft to assess the effects on landing, taxiing and braking. The Air Fighting Development Squadron performed 18 landings in early 1956, 12 by day and 6 at night. The conclusion of the trials was that the effects on the aircraft were negligible and that therefore they were suitable for installation. The main advantage was that any aircraft leaving the runway would not be caused any damage by an elevated light fitting, however the main disadvantage was a restriction on the elevation angle possible with the semi-recessed light for which the RAE was to carry out further trials. Ultimately, high-intensity lights mounted at the runway edges were standardised upon.

5.12 Landing Aids

The initial thoughts were to standardise on the late-war Beam Approach Beacon System (BABS). This was to be for night fighter airfields only, partly because the prime use for the system was at night, and also because it required a second crew member to monitor a cathode ray display and to relay commands to the pilot. However as many day fighters flew at night and were single-seaters, a more practical solution was required.

The first version of the American Ground Controlled Approach (GCA) system (the Gilfillan AN/MPN-1) had been fitted to a number of airfields from 1944 and consisted of a trailer-mounted control room with radar and various antennae. Initially the aircraft was directed to the start of the final leg. The operators then tracked the incoming aircraft in both elevation and azimuth and relayed the aircraft's position relative to the glide slope through a controller talking to the pilot on the standard VHF radio. One advantage of this system was its mobility. However only a limited number of systems were purchased (24) and these were shared between airfields in all Commands.

In 1952, the first of a developed version designated the AN/CPN-4 was installed at the Central Signals Establishment at Watton. This had a greater range, with 40 miles for the general area radar surveillance and 10 miles for the final precision approach, and contained its generator units in a separate trailer. The performance of this system met all expectations and it was agreed that this should become the standard landing aid, not just for Fighter Command airfields. Twenty-five systems were ordered for delivery from July to September 1954, although due to the small numbers involved it was agreed that the new AN/CPN-4 systems would be concentrated at Fighter Command airfields, whilst the existing AN/MPN-1 systems would be concentrated at Bomber Command and Coastal Command airfields. AN/MPN-1 systems already installed

at Fighter Command airfields would be transferred as and when the new equipment arrived. In 1954, airfields equipped with the original system included Coltishall.

The initial batch of new systems was allocated to Linton-on-Ouse, Leeming, Leuchars, Tangmere, Horsham St Faith and Coltishall, in that order. The first two systems didn't arrive until February 1955 and were installed at Linton and Leeming. Deliveries were painfully slow and the airfields allocated to the equipment programme and their order of installation was constantly changed.

Following the delivery of the thirteenth system in March 1956 (allocated to Duxford), all remaining deliveries were to the later AN/MPN-11 standard, the primary difference being an improved method of construction for the trailers. Total orders for AN/CPN-4 and AN/MPN-11 systems were increased to 33. Deliveries were still protracted and, for example, West Malling wasn't re-equipped until April 1957. Some OCU stations were restricted to the original AN/MPN-1 systems whilst many RAuxAF stations had no GCA system installed at the time of their disbandment in March 1957.

Initially a single hardstanding was built for AN/CPN-4/MPN-11 systems to cater for approaches from the primary direction, consistent with the approach lighting (two had been provided for AN/MPN-1 installations). However as the systems were mobile it was realised that they could easily be turned round to facilitate approaches from the reciprocal direction. Trials were undertaken at CFE West Raynham in September 1956 and from these it was recommended that two sites were required for runways of less than 6,863 ft, otherwise a single composite site was acceptable for which No.90 Group proposed a scheme in January 1958.

Equipment upgrades to the GCA caravans included the provision of mains supplies at the hardstandings from 1956, the installation of AN/GPX-8 IFF Mk.10 from 1957 and the installation of TD-58A map generators from 1959. By 1960 a specification was being developed for the replacement of the various GCA systems to ASR.2077.

Prior to starting their approach procedure, aircraft had to be guided to the airfield using direction finding equipment. Initially this was called VHF/DF and was often based in a van parked in the middle of the airfield. The signals crew rotated the aerial by hand to obtain the bearing of the aircraft and relayed this by land line to the Approach Controller in the tower. A new system called Cathode Ray Direction Finding (CRDF) was introduced which was an automatic system that relayed the bearing information directly to a cathode ray screen in the tower. This was initially introduced on bases having short-range day fighters from 1953.

5.13 The Parallel Runway Saga

An idea that occupied the minds of HQ Fighter Command and senior Air Staff was the possibility of using parallel runways, previously alluded to in the January 1950 airfield specification. The first idea investigated was to build a double-width (300 ft) runway that would allow two fighters to take off side-by-side, significantly reducing the time to get a defensive force into the air. Another idea was to build a back-up PSP runway parallel to the existing so that should the main runway become blocked or unserviceable, take-off and landings could still take place. In October 1950 it was proposed that a trial take place at Horsham St Faith, although this was soon moved to Linton-on-Ouse. Drawing FCW/145/50 was prepared for the trial installation although it was noted that this might clash with the new ASP being built. The plans were approved in December but the Air Ministry cancelled the trial on 19 February 1951.

A discussion paper was issued on 20 March 1951. The stated advantages of parallel runways were a quicker form-up time for the squadron once airborne, particularly at coastal airfields, and quicker turn-around times due to dual take-off and landings. Suitable airfields (27) were identified as being candidates and the estimated cost was £8,500,000, including the provision of ORPs at each. The airfields listed included the following:

Coltishall	Duxford	Horsham St Faith
North Weald	Wattisham	West Raynham.

Trials took place at Boscombe Down, Carnaby and Waterbeach in June 1951, looking at different take-off patterns on different sizes of runway. HQ Fighter Command recommended two parallel 150 ft. runways for a Wing of 32 aircraft. Based on this, an average saving of 37 seconds per aircraft would be gained and the cumulative advantage of this for the Wing would be 4 nautical miles at 40,000 ft. A total clear width of 1,200 ft would be required for this proposal comprising: 150 ft clear, 150 ft shoulder, 150 ft runway, 300 ft shoulder, 150 ft runway, 150 ft shoulder, 150 ft clear.

However, the Vice Chief of Air Staff was concerned about the cost of the proposal and the resources it would require to implement. (When Churchill heard of the dual-runway proposal he remarked that ‘...once again the Air Ministry was trying to cover the country in concrete’). As a result of this, HQ Fighter Command resubmitted their proposal on 20 September 1951, this time based on only six airfields. It was decided that the most benefit in terms of response times from having parallel runways would be gained at the flanks of the air defence network. Therefore in the north, Acklington, Drem and Leuchars were put forward, as were Exeter and Hurn in the south-west. Additionally Horsham St Faith was proposed it was seen to cover a direct attack route on London.

The Vice Chief of Air Staff replied on 9 October that the use of standby airfields should be considered to enable rapid turn-arounds to take place. It was conceded that a case could be made for Acklington, Drem, Exeter and Leuchars, but further study was required on Hurn and there was no need for a second runway at Horsham St Faith due to the presence of other nearby airfields such as Coltishall. However it was suggested that Driffield might be upgraded as there was a perceived gap in the air defences in that part of Yorkshire.

The Vice Chief of Air Staff agreed with this conclusion and requested that the storage facilities at the nominated standby airfields be upgraded where necessary. Following this, the Deputy Director of Operations wrote to HQ Fighter Command on 28 February 1952 stating that, due to the economics of the programme, there would be no funding made available for constructing parallel runways at Fighter Command airfields. The operational requirements could be met by using existing standby airfields remote from the home base. These would be used to re-arm and refuel closer to the enemy threat and could also be used for temporary redeployment. In effect this was the same solution as used in the Battle of Britain, twelve years earlier!

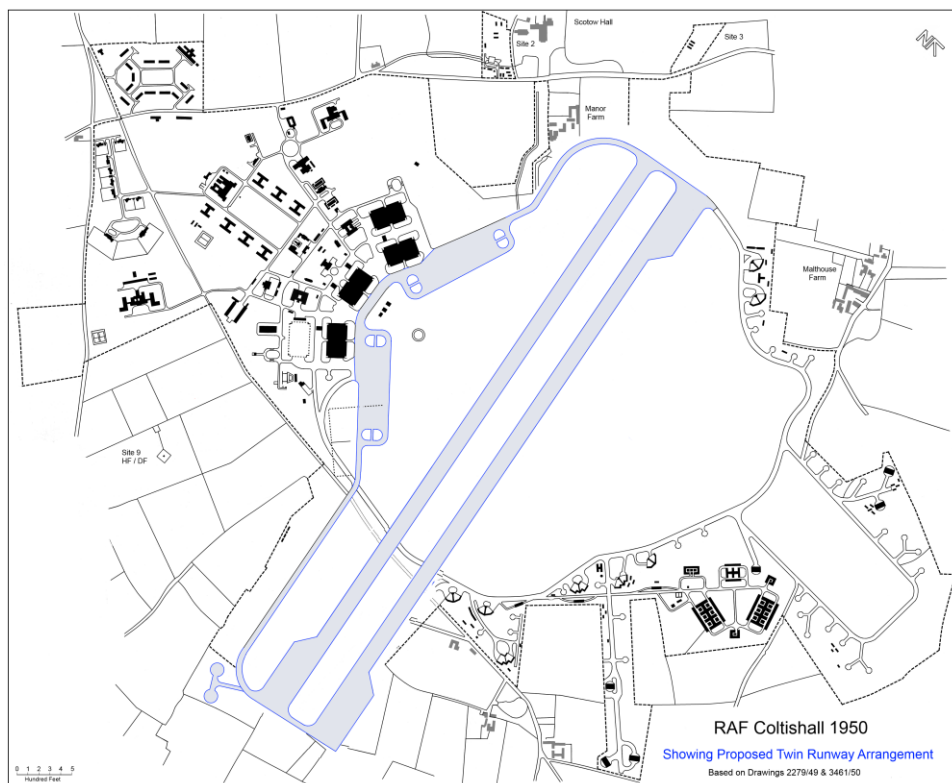


Fig 9: Proposed twin runway arrangement at Coltishall 1950

5.14 Emergency Arrestor Barriers

One outcome of the consideration of aircraft braking performance versus runway length was the decision in December 1953 to purchase two sets of emergency arrestor gear from the USA. These were to be installed at West Raynham for trials by the CFE. This early barrier system, known as the Mk.1 Aircraft Arrestor Gear, relied on a series of drag chains to provide the retardation. The trials took place in the autumn of 1954 and the conclusions were that the system only worked properly if the aircraft was doing a minimum of 40 knots and that it was only suitable for the Sabre and Swift due to their geometry and shape.

In October 1954 Operational Requirement OR.948 was published for a new arrestor system. This specified that it should be suitable for aircraft with all-up weights of up to 50,000 lbs, doing a speed of 70 knots, and be capable of stopping such an aircraft within 500 ft.

Meanwhile, trials took place of the improved Mk.2 system at West Raynham in August 1955. This provided a net barrier 12 ft high and took 1–2 minutes to erect. Following the conclusion of these trials, six sets of Mk.2 gear were ordered, initially for RAF Germany. However Fighter Command petitioned for them to be installed at its airfields, particularly those with Hunters, and so they were fitted during 1956 on the overruns at six of its airfields, including Duxford. The similar Barrier Mk.3 was also ordered of which four sets went to Fighter Command airfields. This had a different net system that was more suited to straight-winged aircraft such as the Meteor and Venom.

OR.948 resulted in the Mk.5 and Mk.6 systems being developed by Borgs Fabriks AB (BEFAB) in Sweden based on their Safeland system, the main difference being that the former had an 850 ft runout whilst the latter would stop the aircraft within 750 ft. The latter system was trialled at RAE Bedford at the end of 1957 and received its release to service in October 1958. It comprised two 14 ft high 'A'-frame masts, supporting a 200-ft-wide net. The masts were electrically raised from horizontal to vertical in 3–4 seconds on command from the tower. Brake assemblies were attached at each end of the lower net cable which allowed the deceleration of the aircraft to be controlled.

The Mk.6 system was cleared for the Hunter, Javelin and Lightning and was to be the standard on Fighter Command stations. Duxford had the first installation in February 1959 and was soon followed by Waterbeach, West Malling, Coltishall, West Raynham and Wattisham.

Further Operational Requirements were issued in February 1960 for the next generation of equipment, OR.8009 for new arrestor gear, whilst OR.8011 covered a recessed airfield arrestor barrier. However they are beyond the scope of this document.

5.15 Dispersal Design

The use of aircraft servicing platforms would normally be used for aircraft in peace time, to enable servicing to be concentrated near the main technical area with its consequent savings in manpower, but the tactical risk of servicing aircraft in this way would not be acceptable in times of war.

The majority of airfields upgraded during the late 1940s retained their wartime dispersals, being of either the frying-pan or spectacle type. The former was preferred by Fighter Command, ensuring isolation for each aircraft. The recommended standard was an 85 ft diameter circle linked at right angles to the perimeter track via a 125-ft-long leg, of 30-ft-width. Dispersals should be separated by at least 250 ft. Of course this ideal was rarely followed due to the available space and geometry of a given airfield. These dispersals were to be used for reducing the risk of damage in the event of attack, the storage of spare aircraft and certain second line maintenance tasks.

Dispersals were then forgotten for the next couple of years until drawing FCW/1/52 was produced in January 1952. This showed a Y-shaped dispersal accommodating two aircraft and surrounded by blast walls. In April drawing FCW/54/52 showed a single 60- ft-long dispersal with entry and exit tracks, protected by concrete and earth blast walls and with redundant blister hangars mounted on top of the walls. The latter was preferred as it allowed the aircraft to be taxied in under its own power. AOC Fighter Command requested a study in June 1952.

By now the USAF in Europe had settled on a Y-shaped design to drawing TAF 1149 and this would appear at UK airfields such as Manston and Woodbridge. The Air Ministry considered that 40 dispersals should be provided and suggested that existing types should be modified with blast walls, scheme FCW/111/52 being produced. It was agreed that two prototypes should be built at Odiham using Pierced Steel Planking to modify existing dispersals to drawings 4948/52 and 5200/52. The trials were soon moved to Tangmere as the existing dispersals at Odiham were deemed unsuitable, resulting in the production of revised drawings. The type 'A' dispersal to drawing 5601/52 was put forward by the Air Ministry and was similar to the American type, adding two 60-ft-wide wings to the existing panhandle and increasing the circular pan to 100 ft diameter. The type 'B' dispersal to drawing 5602/52 forwarded by Fighter Command added two legs to the existing panhandle dispersal, each having its own pan at the end. The latter enabled an aircraft to taxi into position under its own power but would need more concrete.

The prototypes were rapidly built and the trials took place from 17 October using Hunter and Meteor NF.11 aircraft. A Javelin was also planned to be used but none were available. The trials also included the refuelling and re-arming of the aircraft in situ. From these trials the type 'B' was preferred and any new construction was to be prioritised for airfields without ASPs, particularly with all-weather fighters stationed there. A £1 million budget was allocated for dispersal construction from April 1953.

However it was felt that blast walls would be a useful addition to the design and so drawing FCW/3/53 was produced showing each leg widened with blast walls on each side, as well facilities for a local armoury and a hardstanding for a refuelling bowser. The blast walls were to be 16 ft high and 70 ft apart, thus allowing an extra-over blister hangar to be mounted on top to provide some form of protection. These blast walls were designed to offer some defence against shrapnel and strafing attack, whilst allowing the jet efflux to escape when ground-running the engines.

In February 1953 the Fighter Command Airfield Requirements Co-ordinating Committee met, the main topic of discussion being the provision of new dispersals. Both Horsham St Faith and Coltishall were reviewed to see how the new design could be integrated into the existing layout. At first 20 dispersals were considered, catering for 40 aircraft. Going against the original philosophy of re-using existing dispersals, entirely new structures would be built, the estimates being £300,000 and £350,000 respectively.

The next iteration of the design, to drawing FCW/11/53, included a track to guide the nosewheel along the leg of the dispersal to a turntable. FCW/16/53 moved the integral armoury from the inside to the outside of the blast wall. At this stage the cost quoted for building a new dispersal was £12,000, if an existing panhandle dispersal was to be modified it would cost £11,500, and if an existing spectacle dispersal were to be modified it would cost £9,700.

At this point a list of the first airfields to be modified was drawn up. The airfields listed were: Coltishall, Horsham St Faith, Leuchars, Linton-on-Ouse, Tangmere, Waterbeach, Wattisham and West Malling. The former two were selected to be converted first by the Air Ministry on 14 April 1953. Plans for the airfield layouts were drawn up to 3620/53 and 3593/53 respectively. It was suggested that trials ought to take place on the proposed turntable design. Meanwhile the blast wall height was increased to 17 ft and the pan diameter was increased to 53 ft to cater for the Javelin. The number of individual hardstandings required was reduced to 36 (i.e. 18 dispersals) and Duxford and Stradishall were added to the plan in July.

An official drawing for the new design was created in August as 4487/53, whilst another for a modified spectacle dispersal followed as 6116/53. Other airfields were added to the scheme but by the end of the year the need for blast walls at the other stations was removed and in the event, they were only constructed at the original ten selected airfields.

On 26 April 1954, taxiing trials took place at Tangmere using a Javelin on both pan and spectacle dispersals modified with PSP. These showed that the blast walls needed to be further apart, the lead-in taxiway needed to be wider and a bigger turntable would be required. This resulted in a rethink of the design. The access track was widened to 50 ft and the complex turntable and associated nosewheel groove was deleted. Work had already started at several airfields and this was now stopped. By the end of June, following further trials at Tangmere on the mechanical handling and positioning of the aircraft, the decision was made

to delete the turning pan at the end of each leg, where work had yet to start. The lead-in access track was further widened to 70 ft which was the same as the blast wall spacing. The armoury would be retained but it would only cater for belted ammunition, not guided weapons. The dispersal strength was also to be increased to cater for the loading from the Javelin.

5.16 V-Bomber Dispersals

As part of the plans for the V-bomber force, a number of airfields were designated as dispersed sites for either two or four bombers. Some of these airfields were under the control of Fighter Command and the following (amongst others) were allocated as two bomber dispersals:

Coltishall	Leconfield	Leeming
Leuchars	Middleton St George	Wattisham

5.17 The Lightning Aircraft

The introduction by Fighter Command of the new F.23/49 fighter, (later to become the Lightning) presented certain issues involving runway length, both for take-off and landing.

In May 1956, the Air Ministry were considering the construction of 7,500 ft runways at up to 12 Fighter Command airfields in order to be suitable for the Lightning. At that time it was proposed that trials be carried out at Boscombe Down to establish minimum requirements as it already had a 9,000 ft runway – indeed this was the favoured length for use in bad weather. Other points raised included the possibility of Vertical Take-off and Landing (VTOL) aircraft affecting airfield requirements, although it would be another 13 years before the Harrier entered service and even then conventional runways were still used.

An extension and resurfacing programme was begun in April 1957. Leuchars, Middleton St George, Wattisham, Leconfield and Coltishall were all extended to 7,500 ft, or in some cases 9,000 ft, between then and the end of 1958.

Part 6: RAF Coltishall a Peace and War Operational Fighter Station

6.1 Introduction and Notes on Sources

This part examines in more detail concerning pavement and hardstanding upgrades at Coltishall in order to make it a peace and war station. Most of these type of civil engineering projects were in support of aircraft upgrades or the introduction of guided missiles. It is based on surviving Air Ministry and Property Services Agency (PSA) drawings that have been digitised, copies of which are held on site at Coltishall. Another primary source is the PSA document 'Airfield Pavements Maintenance Inspection 1991', a copy of which is also held on site.

6.2 First Post-War Phase, 1948–58

6.2.1 Runway Construction

In 1948, Coltishall became the headquarters of Eastern Sector within 12 Group and 23 and 141 Squadrons moved in from Wittering with Mosquito night fighters. On 13 January 1948 they were joined by 264 Squadron, also from Wittering. The units were kept busy with visits to the Armament Practice Stations at Acklington and Lübeck. However with jet fighters entering service, it was clear that Coltishall's tracked and grass runways were inadequate. Coltishall was selected, along with Duxford and Wattisham, to be one of the first stations upgraded, and to facilitate this the three Mosquito squadrons moved out to Church Fenton on 20 November 1949.

The airfield was rebuilt to drawing 1607/49 and 2279/49 with a single main concrete runway of 6,000 ft, in 7 inches of concrete surfaced with 3 inches of bituminous material laid in two courses. ORPs were provided at each end along the eastern edge of the runway in 8 inch pavement quality concrete on 6 inch dry lean concrete. The runway is aligned on 04/22 with the required spacing for a second parallel runway at 300 ft separation to be constructed later; this is shown on drawings 2279-2280/49, 3099/50 and 3461/50. It is for this reason, that the original ORPs (then called war readiness platforms) were constructed on the eastern side of the runway.

Lighting included high-intensity bidirectional runway lighting, taxi track and approach lighting. Allowance had also been made for the sodium straight line approach or alternatively the more expensive Calvert centre line and bar approach lighting. ASPs totalling 32,300 square yards were also required in the vicinity of the hangars (see below). On 20 October 1949 total costs of £439,000 were approved as follows:

- Runway £273,000
- Servicing Platforms £82,000
- Taxi-tracks £50,000
- Airfield lighting 34,000.

In addition to the above, it was also necessary to buy the area of land having the WWII southern perimeter track as this was not owned by the Air Ministry and had been requisitioned during the war. It had a market value of £7,750, and this figure included demolition of a small number of farm buildings and their rebuilding elsewhere; the cost of the land amounted to £6,000.

Note that a total of 128 acres were actually purchased in 1948, affecting two owners at an approximate cost of £11,750 – the land holding already owned by the Air Ministry prior to this purchase was 534 acres (Treasury Authority S39428/067).

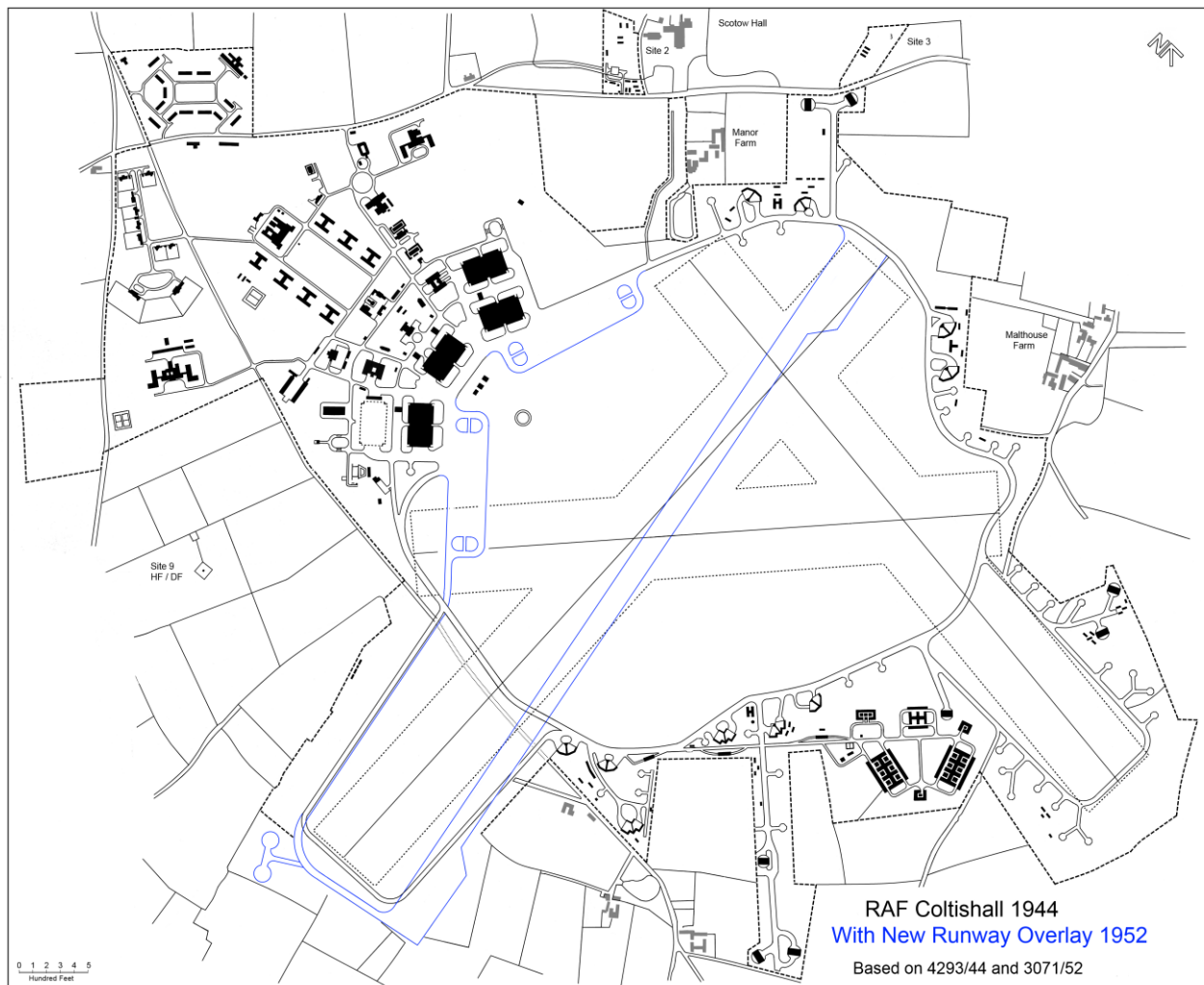


Fig 10: Runway overlay



Plate 43: Aircraft landing

Photo: AHB



Plate 44: Meteors on the ASP being refuelled c.1951



Plate 45: Newly-built airmen's married quarters c.1951.

Photos: AHB

6.2.2 Preparations for the Javelin

In preparation for the introduction of the Javelin fighter, the new western and eastern taxiway which used the bulk of the original WWII perimeter track had to be widened along the inner edge to 49 ft with nominal 175 mm concrete, and a new section was added to straighten out the meandering wartime perimeter track. The old WWII extended perimeter track at the south-western end was partly abandoned (at the extreme southern end), partly incorporated into the new parallel western taxiway ('04' end) and partly into the new runway (at this point the south-eastern parallel taxiway had yet to be built).

The complete western taxi track was then surfaced with 75 mm bituminous material laid in two courses. This work was not completed until after the three squadrons returned in September and October 1950. The cost of this work was £43,000 of which £13,000 was allocated for resurfacing. The WWII E/W grass runway and perimeter track extension was now only in occasional use, the former public road had also been re-opened to the public (closed permanently c.1958).

In 1951 a type 'B' ASP was constructed by the control tower. A third one for 12 aircraft was proposed in October of that year (4930/51) to be located at the close to the existing and straightened perimeter track to the extreme west of the site (opposite Malthouse Farm), together with a new T2 hangar and a Uni-Seco annexe. However, this was cancelled and the two ASPs were built on either side of the control tower in 1951/52. The same drawing also proposed a new 72,000 gallon aviation fuel installation just west of the T2 which was actually built (BFI #3 302). The control tower itself was internally upgraded to drawing 278/51 which included an 'A' centre to control the airfield lighting. All of the pavement work was completed to drawing 3071/52. An update on 7 July 1951 confirmed that Coltishall's runway, ORPs and two ASPs were complete, as were Wattisham's ORP and ASP. The runway work was to LCN 10–16 and would soon require further work to bring it up to LCN 40.

Two short lengths of the new western parallel taxi track ('04' end) on the eastern side from the ORP, built to link up with the existing taxi track were constructed in 1954, in rigid construction of 200 mm pavement quality concrete on 100 mm dry lean concrete. The original WWII taxiway connecting these two parallel lengths was then resurfaced with a single asphalt course.

The western taxiway was also surfaced with an asphalt wearing course and the eastern taxiway was resurfaced with 40 mm asphalt wearing course on a 75 mm base course. The existing AN/MPN-1 GCA system was replaced by a new ground controlled approach, AN/CPN-4 system in August 1955.

A complete reconstruction of the airfield pavements was carried out between 1956 / 57. This was in support of the forthcoming Javelin fighter, to LCN 40 and so both units moved out to Horsham St Faith in October, which were equipped with Venom NF.2s at this point, but converted to Javelins whilst away (drawings 8681A/56 to 8684A/56 refer).

The 3 in thick bituminous surfacing was removed from the runway and the underlying concrete was strengthened with reinforced concrete over-slab, 225 mm thick for 840 ft from the '04' end, and a minimum of 150 mm thick for the remainder of the 6,000 ft length. This was carried out in 120 ft by 20 ft bays. A similar 150 mm RC over-slab was laid on the existing concrete surface of the ORP at the '04' end, and over the existing bituminous surfacing of the western taxiway (except for the new straightened eastern taxiway section) and hangar aprons. Doweled expansion joints were inserted at 120 ft centres, longitudinal joints being tongued and grooved. This work was carried out to drawings 4876/56, 8683A/56 and 8684/56 and was completed in April 1957 at a cost of £407,000. The work not only involved the strengthening of the runway, but also of one ORP, hangar aprons and the western taxiway. The taxiway on the east side and the northern ORP were not worked on, partly to save on costs, and partly because the northern ORP would shortly be made redundant.

6.3 Post-War Dispersals

In order to complete the development of Coltishall as a war readiness station, it was necessary to construct 18 pairs of dual hardstandings to accommodate aircraft of the Hunter, Swift or Javelin types. New dispersals were therefore, constructed in 1954/55 mostly of the protected type which included blast walls, their positions shown for the first time on drawing 7209B/53. These were positioned as two groups of 18, one to the south-west and the other on the east side of the runway. Those at Coltishall were one of the first sets to be built; they were constructed in pairs with a single access track, rather like the letter 'Y', with turning circles at the end of each arm of the 'Y'. Each pair could be served by a refueller vehicle from which a standing was provided between at the junction of the two arms of the 'Y'.

Coltishall never had any suitable panhandle hardstanding from which to redevelop for modern fighters, and therefore the station had to start from scratch. Furthermore, it was also necessary at this stage to complete the development of the airfield by joining the southern taxi track to the south-west end of the runway, so that aircraft would not have to back track before taking off in a north-easterly direction and one section of the old perimeter track required straightening out (see 6.2.2). The cost of this phase one work was £128,000.

Construction was therefore in two phases, the first was the aircraft pavements themselves plus the taxi track work (2908/53), while the second phase (7209A/53) requiring additional funding and Treasury approval, was for the construction of the blast walls, secondary pavement for aircraft servicing and the armoury hut. The blast wall had to be strong enough to withstand rocket attack and so the use of lean-mix concrete was decided upon. The hut was designed to provide accommodation for ready-use stocks of guided weapons, gun packs and ammunition sufficient for one-day's operations for two aircraft. It would be replenished with stocks from a central armament building and from the explosives area during the night. The total cost for Coltishall for this phase of the work came to roughly £79,000 and for the 18 armouries in Uni-Seco hutting was £10,250 plus an erection cost of £14,000.

6.4 Protected and Unprotected Aircraft Hardstandings

All hardstandings were built in two phases, the first was to lay the pavement down to drawing 2908/53, and the second was to build the revetment walls. The concrete slabs are mainly 10 ft square blocks of 6 in concrete laid on 4 inches of rolled dry lean mix. Altogether eight double protected and one double unprotected types were built c.1953 in two groups, one aligned along the SW parallel taxiway and the other on the eastern taxiway.

Those at Coltishall, unlike elsewhere, were started from scratch as there were no existing WWII concrete that was suitable for conversion. Each one has a 'Y'-shaped paved area, the arms of the 'Y' terminating as turning circles. In all cases a refuelling concrete stand is located between the aircraft parking areas. Nearly all are as-built except in more recent times most of the parking areas have concrete slab fillets that have been added between the concrete floors and the revetment walls and these continue towards the turning circle, thus altering their shape. This has not occurred on the unprotected versions and hardstandings 4 (D) and 16 (11) are the only ones that retain their original shape. Hardstanding 17 has been drastically altered to include a tarmacked area for access to building 401 which has been built on the site. The adjacent 16 (11), while it is one of those that retains its original shape, now has building 88 erected on it.



Plate 46: View looking towards the turning circle



Plate 47: Non-protected hardstanding



Plate 48: Protected revetments

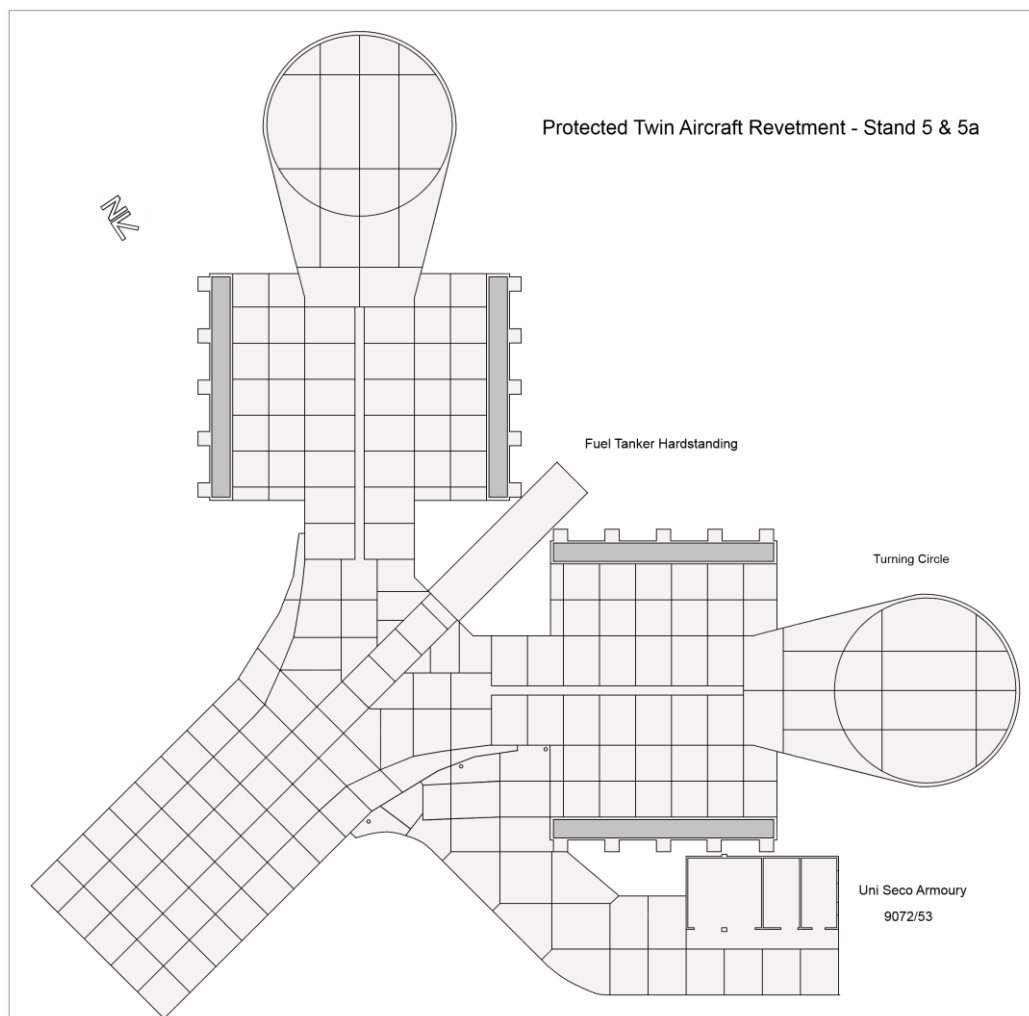


Fig 11: Plan of stand 5 and 5a

Table 2 – Summary of Post-War Aircraft Hardstandings							
all NGRs are TG							
WESTERN SET							
Stand	NGR	Stand	NGR	Stand	NGR	Stand	NGR
1 (A)	26146 22357	2 (B)	26123 22324	3 (C)	26045 22273	4 (D)	26024 22242
5 (1)	26009 22150	5a (2)	25990 22121	6 (3)	25911 22058	7 (4)	25894 22027
8 (5)	25783 21935	9 (6)	25791 21972	10 (7)	25854 22146	11 (8)	25871 22179
12	25918 22242	13	25933 22272	14 (9)	25978 22344	15 (10)	26001 22375
16 (11)	26046 22447	17 (12)	26065 22477	Note that the 1986 numbering had changed by 1999 which is shown in brackets and that 12 & 13 are unprotected			
EASTERN SET							
40	27146 23062	41	27149 23029	42	27132 22918	43	27142 22886
44	27207 22816	45	27218 22784	46	27213 22690	47	27221 22657
48	27246 22555	49	27226 22527	50	27145 22470	51	27112 22456
52	2701622461	53	26983 22448	54	26917 22382	55	26885 22371
Unprotected hardstandings NGR: TG 27306 22810 and TG 27317 22777 (no number allocated for these)							

6.5 1958–60

The units that had left in October had returned on 28 May 1957. No.141 was renumbered as 41 Squadron in February 1958 but moved away to Wattisham on 5 July. No.23 Squadron then moved out on 7 September, back to Horsham St Faith. The reason for these moves was that further runway work was now required to cater for the forthcoming Lightning, primarily by extending it to 7,500 ft; a contract for this work was let on 1 February 1957 to John Laing & Son Ltd. The 1,500 ft extension was laid out continuously reinforced concrete surface without traverse joints. It is 175 mm thick on 100 mm rolled dry-lean concrete. This extension also included a new ORP to the north-west of the runway and a parallel taxiway 1,640 m long, all in similar construction – the old northern ORP then became disused. This work was completed at a cost of £238,000 and involved the laying of 50,000 square yards of concrete.

The additional land required for its construction was in single ownership, covering some 46 acres and affected three farms belonging to the Scottow Estate, the provisional estimated cost for this land was £25,000. The owner of the estate, Lieutenant-Colonel GRD Shaw, retained Hall Farm in the centre of the estate from which 10 acres of permanent pasture and 5 acres of woodland were required. The other two known as Manor Farm and Rookery House Farm were occupied by tenants and were farmed together. The Air Ministry required 4 acres from the former and 27 acres from the latter. This land was partly pasture and partly arable and the cost of acquiring this land came to £3,212 for part of Hall Farm and £2,904 for the other two. Compensation for the loss of tenants' rights came to £445.

Scottow Hall which was largely rebuilt in 1952 formed the centre but the estate would now be severed by the runway extension and together with a proposed road diversion would curtail certain farming and shooting activities and the value of this loss was put at £4,114. In addition to this a number of trees in two plantations situated in the flying approach to the extended runway would have to be felled and compensation was paid of £1,609. It had also been intended to demolish a mortuary chapel which stands within the runway approaches, but it had been found that by reconstructing the roof, the building would satisfy runway approach criteria. This was achieved at a cost of £50.

The total cost of the land requirement was reduced to £12,334 from the provisional estimate of £25,000 and was submitted to the treasury on this basis on 8 October 1959.

Also in 1958, the new north and the old south ORPs were strengthened and extended in preparation for the ORP to handle 12 Javelins, and a new roadway built for tankers and other MT vehicles which was completed

in 8 in reinforced concrete on prepared subgrade to drawing 11232/58. This work cost £28,000 and involved 7,500 square yards of new concrete plus another 2,500 square yards for the access road.

The airfield was ready for re-occupation in June 1959 and 23 Squadron returned, this time joined by 74 Squadron, a Hunter unit. In September, a taste of the future arrived in the form of the Air Fighting Development Squadron from West Raynham, part of the Central Fighter Establishment. Coltishall had been selected as the first Lightning base and so this unit moved in to support the aircraft's introduction by developing new tactics. It was initially equipped with Hunter and Javelin aircraft, the first Lightning not appearing until 23 December, thus neatly closing the decade.

The off-site Instrument landing system middle and outer markers buildings were built and equipment installed in 1958 to drawing 11759A/1958:

- Middle Marker: The Severals, south-east of Swanton Abbot. Located about 3,520 feet from the end of the runway
- Outer Marker: the corner of Church Plantation, south of Pollard Street, Bacton. Located about 31,300 ft from the end of the runway.

The localiser itself was positioned out on the airfield, 450 feet from the runway centre line and 1,100 ft from the end of the runway (at the '04' end – west side).

6.6 Anti-Aircraft Guided Weapons (AAGW)

Coltishall was the first RAF station at which air-to-air guided missiles were operated and funds were sought in January 1957 for the provision of the necessary storage, assembly and maintenance facilities. The airfield was used to mount the service trails of Blue Jay Mk.1 (de Havilland Propellers Ltd Firestreak) and became the prototype airfield for air-to-air missiles and the facilities formed the basis for all future AAGW sites. The Blue Jay trials were planned to commence by March 1959. It was necessary to get as much experience as possible of the operation of the Coltishall installation so that lessons learned in operational techniques could be incorporated in further installations which would be required at the other peace and war airfields. It was requested therefore that a start should be made on the sites construction by 1 March.

The layout was to consist of buildings for storage of unassembled components such as motors, initiators, electronic parts and explosives for the assembly and functional testing processes and stores for holding of ready-use missiles. These facilities totalling 27,000 square feet were planned to be built with the existing boundary, at a combined cost of £160,000, (see Part 12).

6.7 Public Roads

The wartime airfield had meant that two public roads had to be closed under defence regulations, the Coltishall – Skeyton Road to the west and the B1150 Norwich – North Walsham road to the east which had been obliterated. Their permanent closure was regarded by the Air Ministry as essential for the future of RAF Coltishall. If they were reopened, the airfield would be reduced to a minor grass airfield. The reopening of the B1150 road, while it would leave the main strip intact, would reduce the SE/NW grass runway to its wartime length of 2,790 ft. The permanent closure of these roads would involve an expenditure estimated by the Ministry of Transport of £30,000 for the provision of a diversion and improvements of for the Coltishall – Skeyton Road, and £38,000 for the construction of a diversion for the B1150.

After the Treasury had approved the lengthening of the main runway on 13 January 1958, they also gave provision for the construction 2¼ miles of Class 'B' diversionary road north of the airfield, linking up with existing roads to the east and west, at an estimated cost of £70,850. In addition to this, it was also agreed with Norfolk County Council to make an access track leading south from the new diversionary road to Scottow Church at an estimated cost of £1,000 and together with additional and unforeseen construction costs involving the council and the main land owner (Colonel Shaw); the total revised sum as estimated in November 1960, came to £90,755.

6.8 1960–69

From 1 April 1960 until 1 August, the resident squadrons were again detached with 23 and 74 Squadrons going to Horsham St Faith, – AFDS 'A' Flight going to Leconfield and 'B' Flight to West Raynham. The drainage characteristics of the runway was improved by forming a camber to the north-west of the centre line, this was achieved by regulating with dry lean concrete, surfaced with 2 courses of rolled Marshall Asphalt, the wearing course having grooved flails to improve breaking characteristics. The cost of the wearing course and grooving alone came to £40,000 plus £125,000 for the asphalt work. This was necessary because of the increased all-up weight of the Lightning, which had a landing speed of 160 knots and a runway with a length of only 7,500 feet was considered to be too short in bad weather without increasing the breaking coefficient of the runway surface by grooving.

In 1962 the northern ORP was enlarged slightly with the addition of two triangular-shaped fillets which were added to the grass edge in support of a pair of V-bombers. This provided more room near to the starboard wing tips when the aircraft were parked at the required 45 degrees from the runway centreline. A small vehicle link road was also constructed between the ORP and the vehicle servicing road, then a moon-shaped fillet was added between the ORP and the existing taxi-way to enable the Vulcans to negotiate the tight corner when taxiing. A further 60 ft square area of concrete with a 10-ft-wide access track some 50 ft long was also added to the northern end of the ORP; it functioned as a parking apron for the crash fire tender, a caravan and a floodlight. Drawing CIVA/22/65 which applied to Wittering, Wyton, Gaydon, Coltishall and St Mawgan, was for the layout of nose wheel markers, picket points and for the installation of two below-ground high-test peroxide (HTP) vessels in support of the Victor bomber carrying the Blue Steel weapon. The peroxide vessels were to be placed in the grass adjacent to the new triangular-shaped fillets and the picket points were for the cables from thermal heaters for Blue Steel – it is quite likely that they were never built and furthermore, the triangular-shaped fillets are also missing. Despite this, there are four picketing points extant.

A compass platform (282) was built between the northern ORP and the north parallel taxiway.

Around 1965 a new aircraft washing platform (64) was built opposite hangar 3 apron and half of protected hardstanding 'C' was converted into a running-up platform for the Lightning.

6.9 Land Loss and Gain

The quest of disposal of Site 7 (Gymnasium and Chancel) was raised at the end of 1952 – it is unknown whether this took place in 1953 or not.

Around September 1964, Coltishall's VHF receiver site at Hainford was disposed of. This site had been held on a 21 year lease from 25 December 1949, from the firm of Youngs, Crawshay & Youngs Ltd at a rent of £2 10s per annum. At this time there was a receiving site in Stratton Strawless which was also held on a 21 year lease from 15 December 1949, plus a DF homing station held on a similar lease but it is unknown when these two sites were disposed of.

In 1966 more land was required for building additional married quarters and in order to appease the Ministry of Agriculture, Fisheries and Food, some 30 acres of redundant land was offered up in exchange. It is presumed that this area of land is that of the WWII western grass runway extension, beyond the bomb stores.

6.10 1970–90

In 1970, a new sealing compound developed by the National Coal Board, was used to seal serious transverse cracks that had previously been filled, but had cracked again.

The next major runway works took place in 1972; the transverse expansion joints which had been formed by dowels, which had been installed in the reinforced concrete section of the runway during 1957, were removed and modified which was achieved by cutting 900 mm trenches across the runway at each joint. These were then filled in with high-alumina cement concrete. The black top section was resurfaced with

30 mm Marshall Asphalt wearing course on 65 mm Marshall base course and overlaid with 20 mm friction course. Feathering down to the '04' concrete end was carried out over a length of 46 m with 250 mm pavement quality concrete (drawings 285 to 291/72 refer). The contractor was Wimpey Asphalt Ltd.

Also at this time, the '22' concrete end, ORP and part of the parallel taxiway were over-slabbed with 250 mm pavement quality concrete. The rest of the NW parallel taxiway was resurfaced with 30 mm Marshall Asphalt wearing course on 65 mm asphalt base course and a part of the curve at the SW end of the parallel taxiway was overlaid with a 20 mm friction course.

During 1976, a new rectangular 65 mm by 30 m Sea King helicopter pad (115) was constructed adjacent to the NW perimeter taxiway in 200 mm pavement quality concrete on 100 mm dry lean concrete to drawing NAO/146/75. The base has a tie-down base with anchor points. It was extended in 1978 to drawing NAO/43/77/2.

In 1978 the north-western and south-western link taxiways connecting the former runway ends with the western taxiway were resurfaced with 40 mm Marshall Asphalt wearing course on 60 mm Marshall Asphalt base course. In 1981 the south-eastern link taxiway was resurfaced with 40 mm Marshall Asphalt base course.

Also in 1981, the floor of hangar 4 was broken out and reconstructed in 200 mm pavement quality concrete on 100 mm dry lean concrete and the apron to the west of the hangar was resurfaced.

In 1982 the transverse cracks caused by the 1972 transverse expansion joint repair work had to be repaired by breaking out the high-alumina cement concrete which was removed and replaced with reinforced pavement quality concrete and then resurfaced in two courses plus a 20 mm friction course.

The arrester barriers at each end of the runway were resited 60 m back from the thresholds

During 1982, surveys were carried out for a possible Bloodhound deployment at Coltishall; the chosen site was based around the protected hardstandings 54/55, 52/53, 46/47 and 42/43 but nothing came of it.

During 1984, part of the eastern taxiway was resurfaced and three of the 'Y' stands received full depth bay replacements. In 1986 concrete areas of the ASPs were over-slabbed and strips of concrete paving were broken out on various hardstandings during this period.

During 1990, old areas of pavement north-west of hangar 4 were rehabilitated for helicopter use.



Plate 49: Northern ORP – one of several aircraft armed signage painted onto the tarmac surface.



Plate 50: Runway tyre marks, '04' end



Plate 51: Runway tyre marks, '22' end

Photos: Aldon Ferguson 2006



Fig 12: RAF Coltishall site plan, north-west



Fig 13: RAF Coltishall site plan, north-east

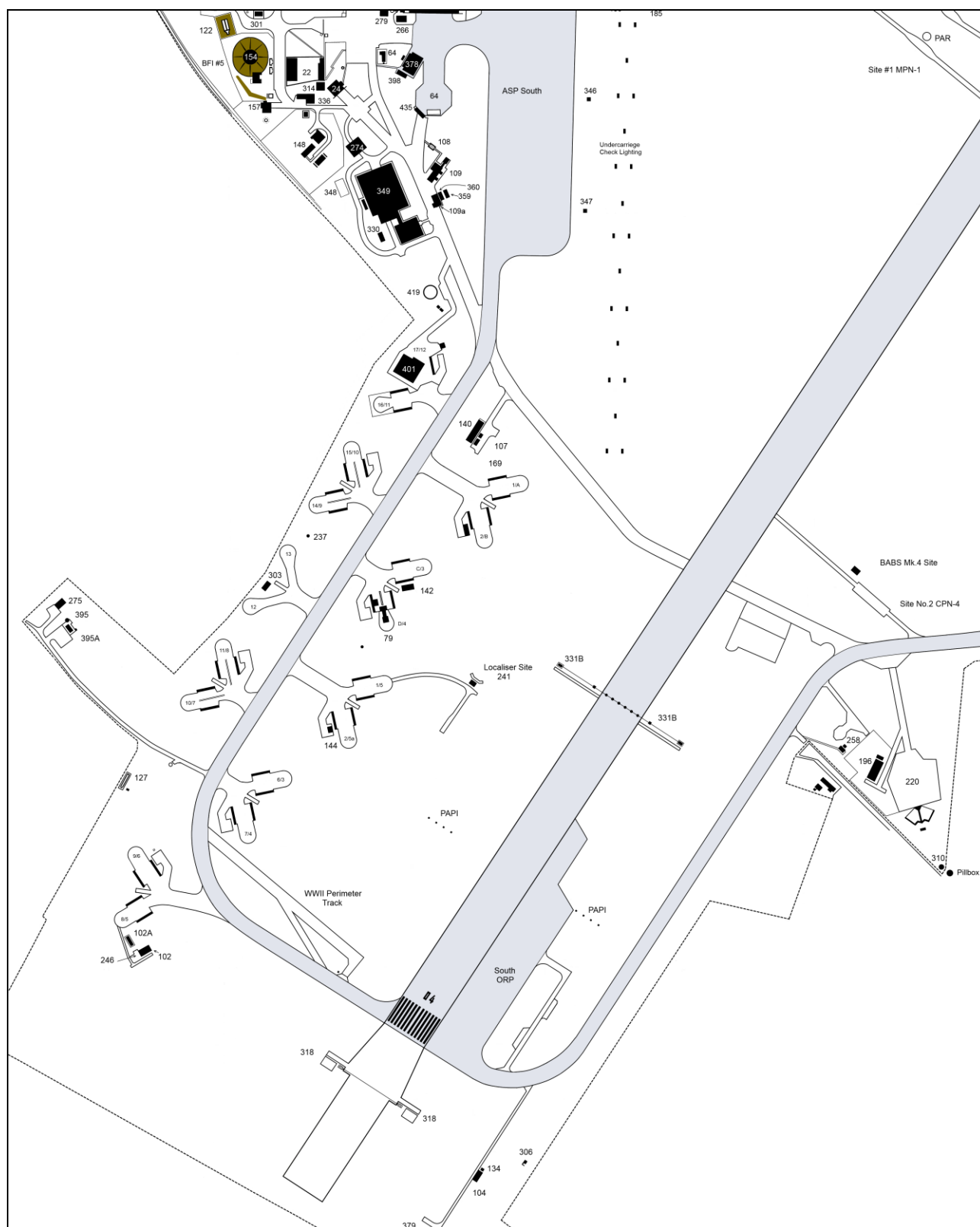


Fig 14: RAF Coltishall site plan, south-west

Note that the western set of hardstanding have two sets of numbers, the first for 1986 and the second in 2000, for example in 2000 stand 11 was known as stand 8 and this is shown here as 11/8.

The hardstands on the eastern side of the airfield do not have this problem, but the non-protected stands are not numbered.

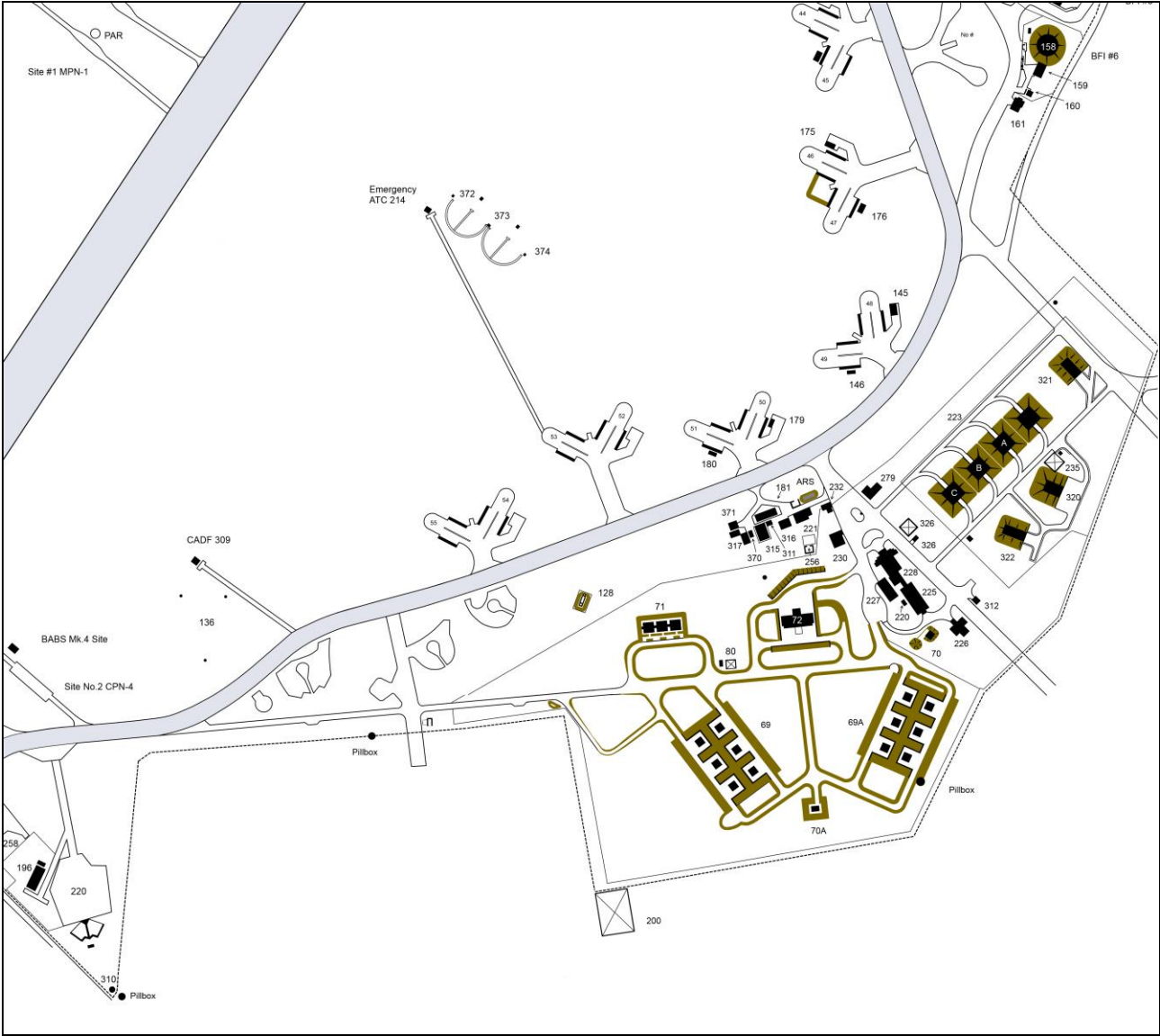


Fig 15: RAF Coltishall site plan, south-east

Part 7: Post-War Airfield Buildings

7.1 Introduction and Notes on Sources to Parts 7 to 12

7.1.1 Parts 7 to 12

Part 7 is the start of the gazetteer of buildings, beginning with the post-war structures out on the airfield, while parts 8 to 12 are standalone reports covering the control tower / hangars (Part 8), technical area (Part 9), domestic site (Parts 10/11) and bomb stores (Part 12). For convenience, buildings of similar function or type design have been placed together under the same titles regardless of location.

The building numbering system above 71 does not necessarily follow any logical order, while buildings numbered below 60 are generally (but not exclusively) those relating to the original pre-war build. There has been a lot of confusion with the existing building numbering with regards to the many prefabricated structures and dispersed cabins, mainly because the cabins tended to move around the site, and their locations depended on what date the airfield site plan was produced.

For clarity I have identified building numbers in brackets except the table in Annex 'B' which is a list of all known numbered buildings present in the year 2000. Type design buildings or building groups have been combined under one heading, even though they might be located at different parts of the airfield, for example BFI # 5 and BFI #6.

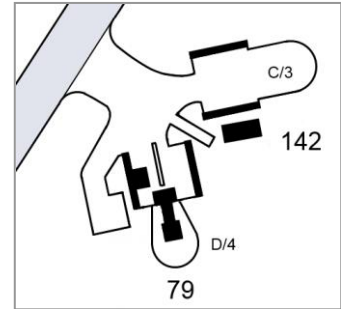
The gazetteers are based on the in-house drawing collection and fieldwork which was carried out over a two-week period in June and a week in August 2013. The quality of the digital drawing collection is quite poor, in most cases very difficult to read and is vast but includes much repetition.

7.1.2 Part 7

It is not easy to categorically say that any of these structures are individually important as most have deteriorated through lack of maintenance or have vital components missing, but when considered as a group, then they have significant group value. Any building that is to be demolished should be properly recorded.

7.2 Jaguar Installed Engine Test Facility (IETF) and Attenuation Cabin (79)

Located on stand 4 / 'D' is an exhaust detuner unit manufactured by IAC Aviation, and a brick-built control cabin. Instead of removing an engine from the aircraft for testing, this arrangement was for an aircraft to back-up to a purpose-built detuner so that both engines can be tested in situ at the same time. The front section or collector takes the exhaust efflux from both engines and cold air is drawn in from the upper section; the cooler exhaust stream is then blown into a tubular section before it is directed upwards through a vertical stack.



The attenuation cabin is a single-storey 11 in cavity brick building with single access. It has a flat timber roof.

- NGR: (79) TG 26017 22241, (detuner) TG 26026 22231



Plate 52: Jaguar installed engine test facility (79)

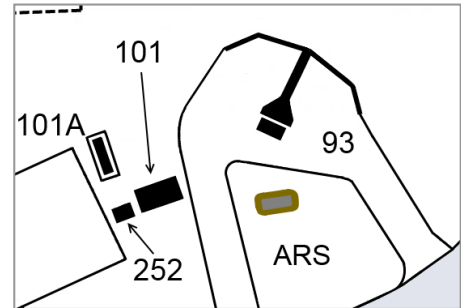


Plate 53: Jaguar installed engine test facility (79)

7.3 'B' Centre (101 and 102)

There are two 'B' centres, one each at the '04' and '22' runway ends; they were essentially remote switching centres, taking selected electronic analogue commands from the 'A' centre located in the control tower to switch half of the lighting of one half of the runway. They each controlled one half in case the other failed, so that there should always be sufficient lighting remaining in case of malfunction of one circuit.

They are single storey with a rectangular-shaped planform, constructed with external walls of 11 in windowless but vented cavity brick, and internal walls of solid 9 in brick. The roof is constructed of hollow Bisson concrete beams. Room arrangement is three rooms with a network of floor cable ducts set two feet into the concrete floor serving the three rooms. The cabling entered the main room which functioned as a controlled switch room, and this room occupies half of the building. The other half is sub-divided into two unequal parts, consisting of a battery and power intake room and a high-voltage regulator room which is only accessible from outside; all external doors are steel fireproof doors and frames. They are associated with electric sub-stations (246 'A' and 252 'H') as well as two deployable standby set units (101A and 101B), but both of these were removed in 2006. Building 102 has the airfield Morse code pundit beacon fixed to the roof.



- Footprint: 34 ft 9 in by 19 ft 7 in, (10.59 by 5.97 m)
- NGR: (101) TG 26742 23371, (102) TG 25786 21893,
(101A) TG 26728 23381, (101B) TG 25773 21903,
(246A) TG 25778 21887, (252H) TG 26734 23364



Plate 54: 'B' centre (101)



Plate 55: Deployable stand-set units (101A)



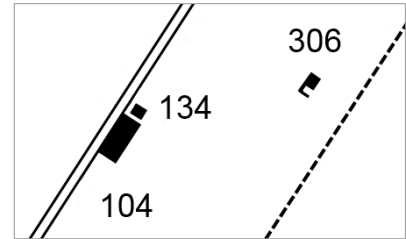
Plate 56: Deployable stand-set units (102A)

Photos: Aldon Ferguson 2006

7.4 Tactical Air Navigation System (TACAN) Building (104) and Tower (134)

7.4.1 Introduction

TACAN is a navigation system used by military aircraft equipped with TACAN avionics and it is used for en route navigation as well as non-precision approaches to the runway. The system evolved from the wartime Oboe system.



7.4.2 Building 104

Constructed c.1978, the TACAN building is a single-storey rectangular-shaped windowless building constructed of brick and concrete block cavity walls with a flat concrete slab roof covered in felt. It has two rooms, separated by a dividing wall, each with single access and these functioned as a power room (single door) and the equipment room (double door).

7.4.3 Tower (134)

Adjacent to the NE end elevation is a steel self-supporting 35 ft high TACAN tower; it is constructed of a series of 5 ft lattice girder units (square-shaped in plan), bolted together and fixed to a concrete foundation (low) plinth. It contains a platform with railings, obstruction lights and the supporting circular framework for the antenna which is missing.

- NGR: (104) TG 26126 21659, (134) TG 26130 21665



Plate 57: TACAN building (104) and tower (134)

7.5 Flying Club Buildings (140), Toilet (107) and Store (169)

Building 140 is the old 41 Squadron main operations cabin but in more recent years it was used as the flying club, while building 169 used to be a 6 Squadron revetment cabin until it was moved to this site. Since this photo was taken (169) has been redeployed to RAF Odiham. Building 107 is a Portaloo cabin and used to be known as Revetment 'A' toilet.

- NGR: (107) TG 26124 22406, (140) TG 26120 22413,
(169) TG 26124 22406

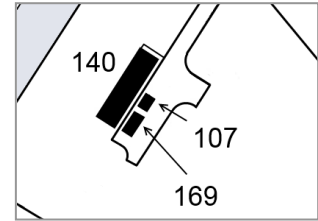


Plate 58: Flying Club store (169) on left

Photo: Aldon Ferguson 2006



Plate 59: Portaloo (107) formally (17) (elsewhere)

7.6 Instrument Landing System Glide Path (135 / 240) and Localiser (241)

The Instrument Landing System (ILS) generates horizontal and vertical radio 'beams' (therefore effectively a narrow 'cone') extending out from the runway, down which the aircraft can be guided to the threshold.

7.6.1 Glide Path

The glide path's function is to enable the pilot to control his aircraft on approach to the runway in a vertical sense so that his glide slope indicator in the cockpit is centred on the display. This ensures that the aircraft follows the glide path (typically 3 degrees, i.e. losing height of 300 feet per nautical mile) in order that it remains above obstructions and reaches the runway at the correct touchdown point. The system was installed c.1972 at Coltishall.



- Footprint: 17 ft 9 in by 13 ft 9 in (5.40 by 4.109m)
- NGR: TG 27312 23488

7.6.2 Localiser

The localiser is an antenna array located at the departure end of the runway. Its function is to guide the pilot to the runway centreline, the pilot controlling his aircraft by looking at the needle on the aircraft omni-bearing indicator which shows any deviation from the runway centre line. The pilot adjusts his flight path until the instrument's needle is dead centre which coincides with the physical runway centreline.

- NGR: TG 26116 22158

7.6.3 Buildings

Both buildings are similar consisting of cement rendered single-storey windowless but vented buildings with a concrete slab roof. The glide path version is positioned on the eastern side of the runway at the '22' end. Its actual position is 650 feet from the end of the runway and 360 feet from the runway edge; the glide path version is associated with an antenna array (135) but this is now missing. The localiser is approximately 1,200 feet from the runway end and 360 feet from the runway edge.

They have a single entrance at the NE end elevation, and are also located at the NE end of a concrete 'Y'-shaped path, the arms of the 'Y' are curved as these contain marker pegs for setting up the aerial plinth and ultimately the beam.



Plate 60: Glide path building (135)

7.7 Nos. 6, 41 and 56 Squadrons Dispersal Cabins

7.7.1 Revetment, Resource and Standby Operations Cabins

Revetment cabins replaced the Uni-Seco armouries on the protected aircraft hardstandings and these were erected after May 1986 – all of the original armouries having been demolished c.1985. The original armouries were also numbered differently from the new cabins. The ‘new’ cabins are believed to be Elliot-Medway portable units constructed of steel-framed units with timber-framed panels clad externally with Colorcoat steel sheeting and internally with plasterboard. Many of these were removed in 2006 and deployed elsewhere, in particular to RAF Odiham.

They were not necessarily erected in the exact same positions of the old armouries; typically a pair of hard standings would have either two revetment cabins or a revetment cabin as well as a resource cabin, or a standby ops and a resources cabin, while the original idea was to have just one armoury. Altogether at Coltishall, there were twelve of the smaller revetment types (four for each squadron), which were arranged open plan while there were just three resource cabins (one for each squadron and these had two equal sized rooms. Standby operations cabins were allocated one per squadron, they were internally arranged as a flying clothing store, planning room and engineering operations.

- Footprint: Revetment Cabin: 9 ft 8 by 8 ft 10 in (6 by 2.7 m)
 Recourse Cabin: 19 ft 8 in by 17 ft 4 in (6 by 5.3 m)
 Standby Operations: 19 ft 8 in by 31 ft 6 in (6 by 9.6 m)

7.7.2 Main Operations Cabins

One main operations cabin was supplied to each squadron. They were all similar, except the 6 Squadron cabin (171) was the only one which had an attached toilet block annexe at the rear. Rooms were arranged as follows: flying clothing store, cine briefing, and a large planning room with a partitioned area for intelligence briefing. The final room was an engineering ops room. These were located away from the protected aircraft hardstandings. Building 140 became the flying club room. They consist of four small cabins bolted together as one unit.

- Footprint: 19 ft 8 in by 63 ft (6.0 by 19.2 m)
- NGR: (140) (41 Squadron) TG 26119 22413 , (171) (6 Squadron) TG 27299 22909, (181) (54 Squadron) TG 27158 22387

Summary of Squadron Dispersal Cabins Located on Protected Aircraft Hardstandings				
Squadron	Bdlg #.	Stand No.	Details	NGR (TG)
41	141	2	Revetment cabin on existing concrete	26107 22314
	142	3	Standby operations cabin on new concrete	26047 22253
	144	5a	Resources cabin on existing concrete	25973 22111
	143	7	Revetment cabin on existing concrete	25880 22013
	146	9	Revetment cabin on existing concrete	25801 21984
	?	11	Revetment cabin on existing concrete	25887 22187
6	165	40	Revetment cabin on existing concrete	27156 23074
	166	41	Revetment cabin on new concrete	27138 23039
	167	42	Standby cabin on existing concrete	27132 22937
	168	43	Resources cabin on new concrete	27127 22889
	169	44	Revetment cabin on existing concrete	27212 22828
	170	45	Revetment cabin on new concrete	27203 22792
54	175	46	Revetment cabin on existing concrete	27217 22701
	176	47	Revetment cabin on new concrete	27239 22652
	177	48	Standby operations on existing concrete	2726? 2257?
	182	49	Recourses cabin on new concrete	27230 22511
	179	50	Revetment cabin on existing concrete	27160 22468
	180	51	Revetment cabin on new concrete	27107 22440
Note that the cabins were deployable buildings and in some cases moved around the station, so the NGRs given in this list may differ from those in Annex 'B' but they are correct for 1986				



Plate 61: Resources cabin (144)



Plate 62: Standby cabin (167)



Plate 63: Main operations cabin / flying club of 41 Squadron (140)

Photo: Aldon Ferguson

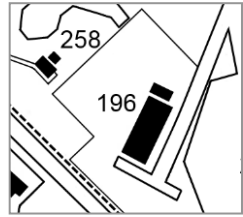


Plate 64: 6 Squadron main operations cabin (171), interior

7.8 UNITER (196)

7.8.1 Introduction

UNITER provided a resilient switching network and an on-site communications facility for operational RAF stations. It is not an acronym, but a project name denoting the fact that it provided new operational communications to meet a defined threat, and in so doing subsumed a number of other obsolescent voice and data networks. There were 43 UNITER sites built across the UK.



The original communications equipment designs were the brainchild of Plessey and GEC, but these two telecom businesses merged in 1988 as GEC-Plessey Telecommunications, then as GPT and later still as Marconi. GEC-Plessey Telecommunications was the prime contractor for UNITER. The company was responsible not only for the entire network design and installation of equipment at RAF stations, but also for the design and layout of the hardened building which housed it. By May 2002, the network had been downsized by Marconi to achieve cost savings and was reduced to 32 sites. It is unknown how many, if any at all, are in commission in 2013.

7.8.2 Building 196

There are two identical UNITERs present at Coltishall (NUB 1 and 2), the latter, (building 196 is the dispersed one. It is a generic design type 3 (large soft) and its designation nationally was 1001 (U). It was completed and operational in September 1993 it was designed by Scott Wilson Kirkpatrick and constructed by Lorne Stewart PLC.

It has two rooms at ground floor level consisting of the technical area, a plant room, and above this room is a plant penthouse. Outside, close to the plant room is a diesel fuel tank in a brick bund.

The building is constructed of concrete block cavity walls with a concrete slab over the plant room and penthouse plus another over the technical room which is carried on a series of capsulated steel beams. It is located within a gated compound and access was not possible.

- NGR: (196) TG 26520 22067



Plate 65: UNITER (196)

7.9 Emergency Air Traffic Control (214)

The emergency air traffic control tower is a small single storey brick-built cement rendered building, with a nominal square-shaped planform. It has a steel framework inside that supports a small visual control room on the roof.

- Footprint: 16 ft 4 in by 18 ft 1 in (4.98 by 5.50 m)
- NGR: (214) TG 26858 22656

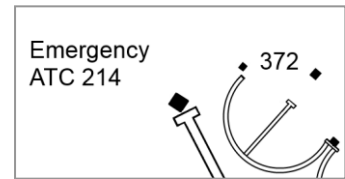
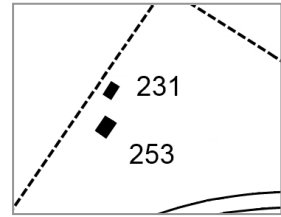


Plate 66: Emergency air traffic control building (214)

7.10 Telescramble North (231) and South (306)

7.10.1 Telescramble System

The telescramble system at Coltishall was distributed to control boxes in the combined operations centre (33), air traffic control (16) and the V-bomber dispersal operational readiness platforms (ORPs) sited adjacent to the runway. There was a feed from control boxes located in the telescramble buildings to the ORP via rubber connectors situated on the grass between the pans. The V-bombers were connected via a flexible cable plugged into the rear underside of the aircraft, which then put the aircraft online into the system. Any broadcast from RAF Strike Command came directly to the pilot and crew via their headsets; the local control ops could also speak to the aircraft commander on the ORP but not back into the system. In this way aircraft could be brought to readiness.



7.10.2 Buildings

The northern building is almost completely hidden at the edge of the wood beyond the Heras fencing. It is purpose-built, single-storey windowless 9 in brick (English bond) building with a nominal square-shaped planform. It has a single entrance on the north elevation which is blocked up, hence access was not possible.

- Footprint: 7 ft 6 in by 8 ft 6 in (2.29 m by 2.59 m)
- NGR: (231) TG 27105 23845, (306) TG 26170 21670

The southern building (306) appears to be a former WWII airfield lighting mechanical and electrical plinth that has been utilised as a telescramble building.

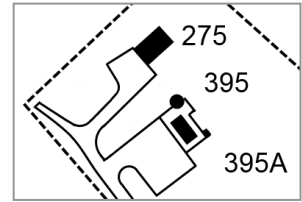


Plate 67: Telescramble building north (231)

7.11 UHF / VHF Transmitter Building (275) and Watchman Radar Tower (395)

7.11.1 UHF / VHF Transmitter Building

The transmitter building was constructed c.1962 a short distance from an existing emergency crash exit road; it would have had an adjacent 90 ft timber tower but this has been demolished. It is a single-storey brick-built (11 in cavity) structure with a rectangular-shaped planform. It had a flimsy light-weight timber roof, the covering of which is missing leaving the fabricated timber trusses exposed. There are a series of metal windows set within continuous lintel and sill bands along both side elevations. There are two access points with timber doors, one to a plant room and the other to the main room. Access was not possible.



7.11.2 Introduction to Watchman Radar

The original makers Plessey Radar Ltd designed and built Watchman radar units, which were then developed by Marconi Electronic Systems; the rights were then acquired by BAE when it absorbed that company in 1999 becoming BAE Systems. The radar provides air traffic control approach surveillance as well as ground controlled approach surveillance and is still used for UK military and civilian airports.

7.11.3 Watchman Radar at Coltishall

Constructed in February 1998 on the UHF/VHF transmitter site by John Martin Construction Ltd and fabricated by PERI Formwork Engineering (a German company), the tower is constructed from four circular reinforced concrete units with single access door. It has a concrete slab roof with railings and obstruction lights. This supported the radar scanner but this has since been removed – the supporting cabin (395A) has also been removed.

- Footprint: 39 ft 4 in (12 m) high by 11 ft 6 in (3.5 m) in diameter (395)
- NGRs: (395) TG 25708 22225, (395A) TG 25713 22218, (275) TG 25702 22242



Plate 68: Watchman radar tower (395) with transmitter building (275) in the background



Plate 69: UHF / VHF transmitter building (275), exterior



Plate 70: UHF / VHF transmitter building (275), interior

7.12 Waste AVTUR Store (288)

Constructed on fighter stand 11, is a gated compound for storing waste AVTUR; it consists of a 2-bay, 23 ft 4 in span Belcon portal open reinforced concrete framework with wall posts at 15 ft centres. The roof is sheeted with profiled metal cladding, but all four sides are open with 6 in dwarf walls which form a shallow bund.

▫ NGR: (288) TG 26027 22442

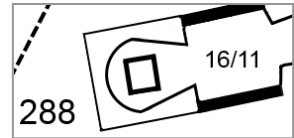


Plate 71: Waste AVTUR compound



Plate 72: Waste AVTUR compound

7.13 AR-15 Radar Building (303)

AR-15 radar was developed by Plessey in the 1970s, from the AR1 radar and sold from 1972. It was an air traffic control, air surveillance radar with a range of 80 nautical miles and a height capability of 50,000 feet, and was replaced by another Plessey product known as Watchman. The radar building (303) housed the receiving and transmitting cabinets and supported the aerial.

It is single storey with a rectangular-shaped planform. It is presumed to be constructed of cement rendered windowless, but vented 9 in thick brick exterior walls with a concrete slab roof. The roof perimeter contains a pair of concrete beams for supporting the radar unit and its perimeter has steel railings. Access was not possible.

▫ NGR: (303) TG 25908 22256

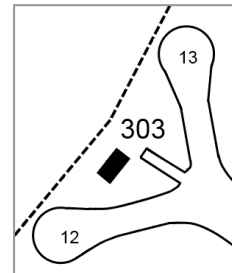
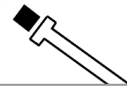


Plate 73: AR-15 Radar Building (303)

7.14 Commutated Antenna Direction Finding Building (309)

This is a single storey building with a square-shaped planform which has been built to drawing 1830/59 and is dated April 1959. CADF installations were manufactured by Standard Telephones and Cables Ltd, who then described them as '*the most notable advance in direction finding since the Adcock aerial in 1916*'

CADF 309



CADF was a post WWII innovation using Doppler principles. Whereas many earlier direction finding systems used a physically rotating aerial, turned manually by the operator to get a 'fix', this system had 18 stationary aerals arranged in a circle at 20-degree intervals. The signal received from the aircraft at each single antenna was sampled in turn by a rapid electronic switch or commutator. By comparing the signals from each antenna and its neighbours it was possible to determine which one was closest to the aircraft and hence its direction could be found. (Note the early Marconi Adcock system used four large fixed aerals in a square, and the operator manually rotated a goniometer which compared the signals from each).

The building is windowless with a single access point, constructed of 11 cavity brick with a 6 in concrete slab roof and is constructed above a slightly raised concrete raft. It is surrounded by twelve 8 in-square reinforced concrete columns at 5 ft 3 in centres that are taller than the building, and these are arranged in a circle. There is a ring of six similar but smaller-in-height posts above the roof. These used to support a horizontal counterpoise aerial array but this is now missing.

- Footprint (building): 13 ft by 13 ft (3.96 by 3.96 m) (building only)
- NGR: (309) TG 26660 22347



Plate 74: Commutated Antenna Direction Finding Building (309)

Photo: Aldon Ferguson 2006

7.15 Timber Poles (136)

These timber poles are of unknown function, they are connected with the commutated antennae direction finding building (309) and are positioned in a triangle. They may have been connected with monitoring and calibration of the system.

- NGR: (136) TG 2664 22259 (one example)

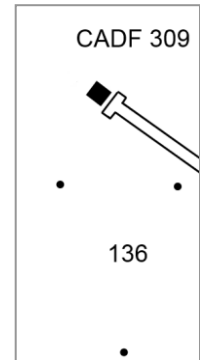
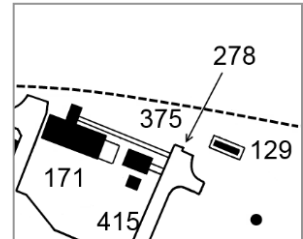


Plate 75: CADF timer poles

7.16 UHF / VHF Receiving Building (375) with Hybrid Tower (415) and UHF / VHF Transmitter Building (384) and Tower (385)

The UHF / VHF transmitter and receiving buildings are dispersed from one another with the receiving one located out on the airfield on the far north-west boundary, and the transmitting one at the northern end of the technical area. Only one aerial mast is extant (415).



Both buildings are thought to be similar, and are single storey, constructed of 11 in cavity brick with a single access point and a timber truss roof clad with Marley tiles.

Internally there are two rooms, consisting of a lobby (14 ft by 5 ft 5 in) and the technical room (14 ft 2 in by 13 ft 11 in). The receiving building replaced an earlier one constructed in 1962 which was similar to the old transmitting building (275) (which is extant).

The tower (415) which is adjacent to the receiving building is a composite construction, having lattice steel at low level, with a wooden upper level. It rises to 46 ft (14 m).

- NGR: (375) TG 27320 22901, (415) TG 27319 22894, (384) TG 26365 23580, (385) TG26373 23571

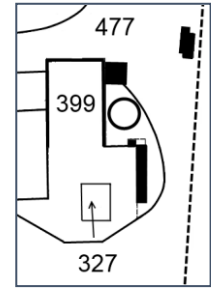


Plate 76: UHF / VHF Receiving Building and hybrid tower (415)

7.17 Fire Fighting Practice Area (327 and 399), Foam Store (477) and Water Storage Tank (478)

7.17.1 Introduction

This is a complex of raised pavements and bunded areas (327 and 399) that have been overlaid on top of the floor of a fighter pen, designed for foam when used for practice on redundant airframes for fire and rescue purposes. There is a building functioning as a foam store (477) and a water storage tank (478).



7.17.2 Foam Store

The store is a small single-storey concrete block construction with a single door having a concrete access ramp. The roof is flat, of timber joists and wooden decking covered in felt.

7.17.3 Water Storage Tank

The water storage tank circular form was installed in May 2003; it was made by Vulcan Tanks Ltd with galvanised steel, and when full contains 23,000 litres.

- Footprint: (477) 11 ft 10 in by 13 ft 3 in (3.60 by 4.04 m)
(478) 20 ft 4 in by 3 ft 11 in (6.2 by 1.2 m)
- NGR: (327) TG 27231 23037, (399) TG 27229 23073, (477) TG 27245 23084,
(478) TG 27244 23077



Plate 77: Foam store (477) and water storage tank (478)

7.18 Engineering Wing Cabin Control Station (424) and Operations Wing Flying Clothing Station (425)

7.18.1 Engineering Wing Cabin Control Station (424)

Located on stand 41 is a single width Anglo-Scottish cabin; it is timber framed clad with prefinished plywood in eleven bays.

- Footprint: 11 ft 7 in by 43 ft 9 in (3.53 by 13.33 m)
- NGR: TG 27161 23017

7.18.2 Operations Wing Flying Clothing Station (425)

Located close to the 6 Squadron main operations cabin (171) is another Anglo-Scottish cabin of similar type which is in very poor condition

- Footprint: 11 ft 7 in by 29 ft 5 in (3.53 by 8.97 m)
- NGR: TG 27279 22904

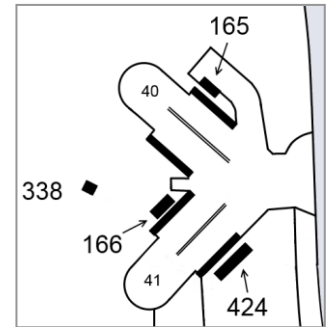
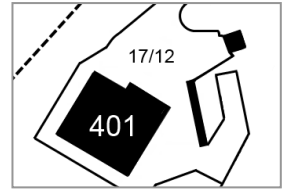


Plate 78: Engineering wing cabin control station (424)

7.19 Packed POL Hazardous Area (401)

Designed by Lambert Scott & Innes and erected in 1997, the packed POL hazardous area occupies an aircraft, revetment and hardstanding (stand 17); it is made up of a brick storage building and an external modern barn-like storage area (67 ft 3 in by 34 ft 5 in). There is also a small reinforced fibreglass cabin containing mechanical and electrical control gear.



The facility is steel framed, made up of a single storey portal framework of two different heights and spans. The smaller one is infilled with concrete block and brick external cavity walls forming a windowless building that functioned as a repackaging area. In 1999 this part was extended to include another repackaging room.

The barn structure (the portal frames are arranged as four bays) is built over a bunded area and is gated and fenced between stanchions at low level and clad with profiled metal sheeting above so it is very well ventilated. The roof is also clad with profiled metal sheeting.

▫ NGR: TG 26052 22478



Plate 79: Packed POL Hazardous Area (401)



Plate 80: Packed POL Hazardous Area (401)

7.20 Miscellaneous Airfield Structures (non-building number structures)



Plate 81: Illuminated runway marker board
The design dates from 1969



Plate 82: Reyrolle power distribution unit Mk.1
Reyrolle, a Tyneside company, installed these in 1956 on the northern operational readiness platform



Plate 83: Precision Approach Path Indicator (PAPI) lights

This is a visual aid that provides information to help a pilot acquire and maintain the correct angle of approach, and consists of a light array positioned either side of the runway at both ends. Each side consists of four equi-spaced, but at slightly different angle, light units which provide a coloured visual indication of an aircraft's position relative to the designated glide slope for the runway. Each light unit emits a high-intensity beam, the lower segment being red and the upper part is white. The transition between the two colours takes place at an angle of just three minutes of arc so that the pilot can manoeuvre his aircraft to follow the correct glide slope to obtain two red and two white lights. (Four whites is far too high, four reds is far too low leading to the expression 'four reds— you're dead!'). The system, manufactured by GEC, was installed in 1983.



Plate 84: Precision Approach Path Indicator



Plate 85: Precision Approach Radar (PAR) plinth

This was an approach system that gave lateral and vertical guidance to air traffic controllers monitoring an aircraft's position, so that a talk-down controller could issue verbal instructions to a pilot so that he could keep his aircraft on course during final approach. All that remains is the concrete foundation circle which was constructed in 1961 for the SLA-3C radar antenna. The internal radius is 13 ft 7 in and the width of the dwarf wall is 3 ft. The circular form carried a welded rail in six sections which enabled the antenna to turn.



Plate 86: Perimeter track traffic lights located before intersection with the runway
They date from 1978



Plate 87: Undercarriage viewing light



Plate 88: ORP cable snatch block



Plate 89: Runway light fittings, flush type



Plate 90: Instrument runway light fittings, elevated types

These have two unidirectional high-intensity and a central omnidirectional low-intensity fitting.

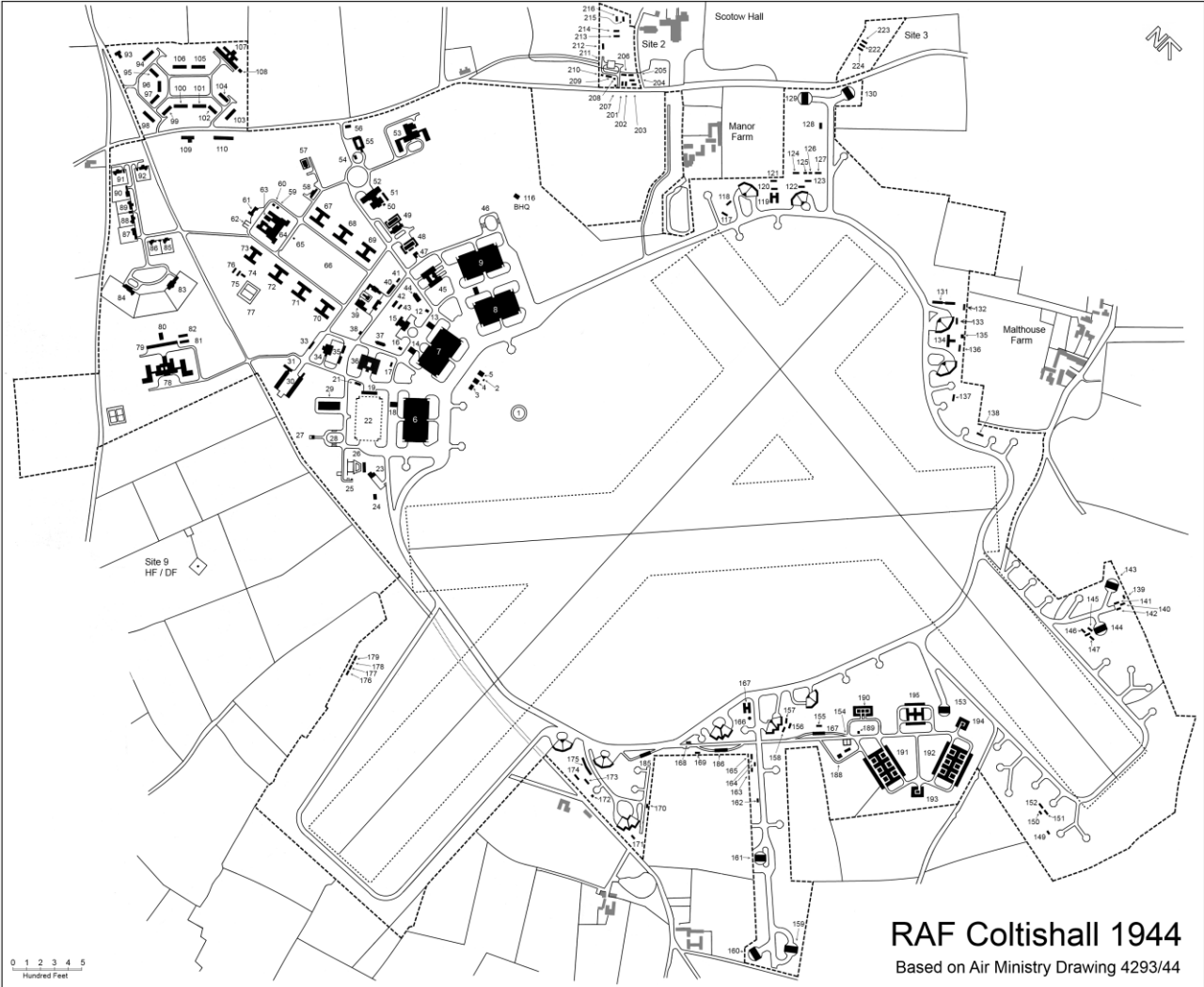


Fig 16: RAF Coltishall site plan 1944

Appendix II – 1944 Site Plan Schedule of Buildings

Bldg	Description	Bldg	Description	Bldg	Description
1	Compass Platform	2	Fire Party Hut	3	NFE Store
4	Control Tower	5	Fire Tender Shelter	6	Aircraft Shed type 'C'
7	Aircraft Shed type 'C'	8	Aircraft Shed type 'C'	9	Aircraft Shed type 'C'
10	Petrol Tanker Shed	11	Latrine Block	12	Ready Use Pyro Store
13	Petrol Tanker Shed	14	Petrol Tanker Shed	15	Armoury
16	RY Pyro Store	17	Latrine Block	18	Petrol Tanker Shed
19	Oil Compound	20	Salvage Oil Tank	21	Unknown
22	Aircraft Shed Site For	23	Machine Gun Test Butt	24	Army Quarters
25	Destructor House	26	M/G Range	27	Practice Bomb Store
28	Aviation Petrol Installation	29	Field Force MT Shed	30	MT Vehicle Sheds
31	Special Protected Bay	32	MT Petrol Installation	33	Articulated Trailer Shed
34	Central Heating Station`	35	Fuel Yard	36	Main Stores
37	Lubricant & Inflammable Store	38	Bulk Oil Installation	39	Works Services Building
40	Camouflage Paint Store	41	Bulk Oil Installation	42	Link Trainer
43	Link Trainer Store & Office	44	Parachute Store	45	Main Workshops
46	Aviation Petrol Installation	47	Ambulance Garage & Mortuary	48	Gas Decontamination Centre
49	Sick Quarters & Annexe	50	Speech Broadcasting Building	51	Signals & Sports Equipt Store
52	Station Headquarters	53	Sergeants' Mess & Quarters	54	Post Office
55	Guard & Fire Party House	56	Picket Post	57	Stand by Set House
58	WAAF Gas Decontamination	59	WAAF Rest Room	60	WAAF Latrines
61	Station Stores	62	Fuel Compound	63	Vegetable Store
64	Dining Room & Institute	65	Vegetable Store	66	Parade Ground
67	Barrack Block type 8/84	66	Barrack Block type 8/84	67	Barrack Block 8/84
68	Barrack Block type 8/84	69	Barrack Block type 8/84	70	Barrack Block 8/84
71	Barrack Block type 8/84	72	Barrack Block type 8/84	73	Barrack Block type 8/56
74	Barrack Hut	75	Barrack Hut	76	Barrack Hut
77	Lawn Tennis Courts	78	Officers' Mess & Quarters	79	Officers' Garages
80	Squash Court	81	Officers' Quarters	82	Officers' Quarters
83	Married Officers Quarter's	84	Married Officers Quarter's	85	Married Officers Quarter's
86	Married Officers Quarter's	87	Married Officers Quarter's	88	Married Officers Quarter's
89	Married Officers Quarter's	90	Married Officer's Quarters	91	Married Officer's Quarters
92	Married Officer's Quarters	93	Married WO's Quarters	94	Married Airmen's Quarters
95	Married Airmen's Quarters	96	Married Airmen's Quarters	97	Married Airmen's Quarters
98	Married Airmen's Quarters	99	Married Airmen's Quarters	100	Married Airmen's Quarters
101	Married Airmen's Quarters	102	Married Airmen's Quarters	103	Married Airmen's Quarters
104	Married Airmen's Quarters	105	Married Airmen's Quarters	106	Married Airmen's Quarters
107	WAAF Drying Room	108	WAAF Staff Sleeping Quarters	109	Grocery Shop & Store
110	Church Army Hut	111 to 115 not allocated		116	Battle Headquarters
117	Radar Workshop	118	General Purpose Hut	119	Flight Offices & Workshop
120	Crew Hut	121	Sleeping Shelter	122	Latrine & Drying Room
123	Sleeping Shelter	124	Army Hut / Ablutions	125	SAA Store
126	Army Hut	127	Army Hut	128	Flight Offices & Workshop
129	Blister Hangar type EO	130	Blister Hangar type EO	131	Flight Offices & Workshop
132	Sleeping Shelter	133	Latrine	134	Flight Office & Workshop

RAF Coltishall Parts 1 to 7

Bldg	Description	Bldg	Description	Bldg	Description
135	Sleeping Shelter	136	Flight Offices & Workshop	137	SAA Stores
138	SAA Stores	139	Store	140	Army Hut
141	Army Barrack Hut	142	Army Barrack Hut	143	Blister Hangar type EO
144	Blister Hangar type EO	145	Latrine Block	146	Latrine Block
147	Flight Offices	148	SAA Stores	149	SAA Stores
150	Latrine Block	151	Flight Offices	152	Flight Offices
153	Blister Hangar type EO	154	Fuel Store	155	Sleeping Shelter
156	Army Hut	157	Army Hut	158	Army Hut
159	Blister Hangar type EO	160	Blister Hangar type EO	161	Blister Hangar type EO
162	SAA Stores	163	Hut	164	SAA Store
165	Sea Rescue Hut (Nissen)	166	Latrine & Drying Room	167	Flight Offices & Workshop
168	Sleeping Shelter	169	Store	170	Ammunition Store
171	Sleeping Shelter	172	SAA Store	173	Latrine & Drying Room
174	Sleeping Shelter	175	Flight Office & Workshop	176	Army Barrack Hut
177		178	Army Latrines	179	Army Hut, Kitchen & Ablutions
180 to 184 not allocated		185	Bomb Fuzing Point	186	Bomb Fuzing Point
187	Bomb Fuzing Point	188	2-Pdr AA Ammunition Store	189	TR 3107
190	Incendiary Bombs & Pyro Store	191	Bomb Stores	192	Bomb Stores
193	Component Store	194	Component Store	195	Fuzed & Spare Bomb Store

Appendix III – Summary of RAF Coltishall Buildings (for the year 2000)

Bdlg	Description	Report Part	NGR (all TG)
1	Aircraft Hangar type 'C'	8.1	2625 2313
2	Aircraft Hangar type 'C'	8.1	2613 2303
3	Aircraft Hangar type 'C'	8.1	2608 2289
4	Aircraft Hangar type 'C'	8.1	2622 2323
5	Station Armoury	9.1	25972 22908
6	Petrol Tanker Shed / 6 Squadron Store	8.2	26031 22920
6A	Petrol Tanker Shed	8.2	26068 23038
6B	Petrol Tanker Shed / Ground Crew Room	8.2	26108 23090
6C	Petrol Tanker Shed / Store	8.2	26205 23164
7	AEF Training Cell	9.2	25998 22921
8	Aviation Fuel Installation / EWS Tank	8.3	26235 23309
9	Toilet Block	9.3	26121 23144
9A	Toilet Block	9.3	26024 23007
10	Pyro Store	9.4	26045 23038
10A	Pyro Store	9.4	26098 23112
11	Armoury / Photo Section / Supply Store	N/A MOJ Site	26049 23092
12	Main Stores / Main Supply	9.5	25974 23005
13	Lubricant & Inflammable Stores	N/A MOJ Site	26004 23049
14	Fields Force MT Shed / Cinema / Ground Support Equipment	9.6	25887 22909
14A	Battery Charging Bay	9.6	25916 22914
15	Parachute Store / SES	9.7	26075 23143
16	Watch Office with Met Section / ATC & Met Office	8.4	26216 22974
17(+A)	Station Workshops	9.8	26106 23189
18	Air Ministry Works Department / Property Management	N/A MOJ Site	25978 23141
18A	AMWD Water Tower	N/A MOJ Site	25966 23149
19	Central Heating Station	N/A MOJ Site	25882 23035
20	Fuel Compound	N/A MOJ Site	25903 23029
21	ESA Seat Arming Storage Bay	8.5	26222 23166
22	25 m Range	9.9	25950 22781
23	Ambulance Garage & Mortuary / Rugby Club	10.1	26068 23237
24	40 ft MG Range / SICARD Store	9.10	25979 22763
25	Unknown	N/A MOJ Site	25944 23138
26	Emergency Borehole	N/A MOJ Site	25949 23188
27A	Barrack Block type 8/84 / Gibson Block	N/A MOJ Site	25866 23314
27B	Barrack Block type 8/84 / Braham Block	N/A MOJ Site	25916 23277
27C	Barrack Block type 8/84 / Chisholm Block	N/A MOJ Site	25966 23241
27D	Barrack Block type 8/84 / Townsend Block	N/A MOJ Site	25879 23116
27E	Barrack Block type 8/84 / Cunningham Block	N/A MOJ Site	25828 23153
27F	Barrack Block type 8/84 / Aitkin Block	N/A MOJ Site	25778 23189
28	Barrack Block type 8/56 / Stevens Block	N/A MOJ Site	25722 23228
29	WAAF Decontamination Block type 'G'	10.2	25852 23366
30	Components Store	N/A MOJ Site	26034 23115
31	Speech Broadcasting	10.3	26001 23343
32	Decontamination Centre / Command & Control Centre	10.4	26056 23256
33	Sick Quarters & Annexe / Station Medical Centre	10.5	26031 23290
34	Sports Field	N/A	26226 23548

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
35	Station Headquarters & Operations Block	10.6	25975 23361
36	MT Vehicle Shed / MTMS	N/A MOJ Site	25822 22960
37	MT Vehicle Shed / MTMS Offices	N/A MOJ Site	25790 22972
38	Articulated Trailer Shed / MT Store	N/A MOJ Site	25853 23044
39	Practise Bomb Store & Gas Chamber / GSES Store	9.11	25854 22847
40	Guard & Fire Party House	10.7	25948 23473
41	Sergeants' Mess	10.8	26056 23490
41A	Sergeants Mess Annexe	10.8	26124 23525
42	Ration Store	N/A MOJ Site Removed	25724 23322
43	WRAF Toilet / Colt Bowl Store	N/A MOJ Site	25758 23341
44	Combined Institute & Dinging Room / Junior Ranks Mess	N/A MOJ Site	25769 23286
45	Spar Grocery Shop	N/A	25575 23474
46	Electrical Plinth 'X'	Unknown	2594 2297
47	Hangar 3 Toilets	8.6	26044 22919
48	Sewage Treatment Works	N/A Sewage Works Site	25108 22462
49	ESA Pyro Store	8.7	26278 22967
50	Officers' Mess & Single Officers' Quarters	11.1	25541 22994
50A	Officers' Mess Annexe	11.2	25466 22971
50B	Seco Hut	Removed	25514 22994
51	Officers' Mess Garages	11.3	25532 23041
52	Squash Racquets Court	11.4	25526 23068
53	Single Officers Quarters Boiler House	11.5	25484 23007
54	Junior Ranks Tennis Courts	N/A MOJ Site	25722 23148
55	Officers' Tennis Courts	N/A	25431 22884
56	Parade Ground	N/A MOJ Site	25873 23219
57	Flag Pole	N/A MOJ Site	2594 2340
58	Standby Set House	10.9	25836 23430
59	Link Trainer / Quest	N/A MOJ Site	26029 23135
60	Nissen Hut	N/A MOJ Site Demolished	2604 2312
62	Motor Club	9.12	25850 22886
63	Toilet Block – Hangar 4 LOX Toilet	Removed	Unknown
64	Aircraft Wash Facility	9.13	26077 22753
65	Post Office / RAF Police Flight	10.10	25941 23449
66	Station Incinerator	10.11	26097 23269
67	PSA Battery Shop / Stores	N/A MOJ Site	26039 23128
68	WSM Offices	N/A MOJ Site	25987 23184
69/1	Bomb Store	12.2	27119 22169
69/A1	Bomb Store	12.2	27276 22199
70	Component Store	12.3	27295 22280
70A	Component Store	12.3	27198 22128
71	Incendiary Bomb Store	12.4	27067 22289
72	Missile Preparation Facility	12.6	27182 22294
76	Catering Store	N/A MOJ Site	25762 23335
78	LOX Store	8.8	26183 23299
79	Aircraft Attenuation Cabin	7.2	26015 22240
80	EWS Tank	12.7	27124 22256
81	Compressor Room H1	8.9	26221 23086

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
82	Compressor Room H2	8.9	26285 23173
83	Compressor Room H3	8.9	26109 22932
84	Compressor Room H4	8.9	26049 22841
85	Middle Marker	N/A Off Site Horstead	Unknown
86	Outer Marker	N/A Off Site St Faith	Unknown
87	Electrical Plinth 'F'	N/A	25828 23029
88	Hangar 1 Toilet Block	8.6	26209 23150
89	Electrical Plinth 'S'	9.34	26053 23002
90	Electrical Plinth 'T'	8.10	26259 23169
91	Electrical Plinth 'U'	8.10	26096 23049
92	Electrical Plinth 'V'	8.10	26043 22865
93	Salvage Compound	2.8	26772 23390
94	Echelon Helicopter Standing	N/A	26695 23355
95	Electrical Plinth 'W'	N/A	26144 23240
96	Electrical Plinth 'Y'	N/A	26422 23275
97	3-Bay Ejector Seat Store	8.5	25971 22870
98	SICARD Store (MT Workshop)	N/A MOJ Site	25806 22909
99	Roller Brake Tester	N/A MOJ Site	25767 22981
100	Gymnasium	10.12	26085 23333
101	'B' Centre	7.3	26743 23371
101A	Standby Generator	Removed	26728 23381
102	'B' Centre	7.3	25788 21893
102A	Standby Generator	Removed	25773 21903
103	RVR Tower	Removed	27134 23659
104	TACAN	7.4	26126 21659
105	Fire Section Store	8.11	26338 22973
106	6 Squadron Store	8.11	26264 22848
107	Revetment 'A' Toilet	7.5	26124 22406
108	Fuel Storage Tanks	9.14	26077 22704
109	Engine Test House	9.14	26077 22673
109A	Engine Test Crew Room	9.15	26081 22648
110	Seat Arming Storage Bay	8.5	26034 22904
111	Hazardous Chemical Store	8.12	26085 23033
112	Generator Fuel Tank	10.9	25847 23411
113	Sewage Pumps	N/A	26012 22610
114	Fire Emergency Water Supply	N/A MOJ Site	25929 23080
115	Helicopter Stand	N/A	26633 23196
116	Crane Bay	N/A MOJ Site	25774 22955
117	MT Crew Room	N/A MOJ Site	25814 23008
118	Bader Barrack Block	N/A MOJ Site	25903 23172
119	Crowley Milling Barrack Block	N/A MOJ Site	25908 23149
120	Oil Interceptor # 1	N/A	26422 23252
121	Oil Interceptor # 2	N/A	25792 23049
122	Oil Interceptor # 3	N/A	25874 22825
123	Oil Interceptor # 4	N/A	26005 22204
124	Oil Interceptor # 5	N/A MOJ Site	25950 23113
125	Oil Interceptor # 6	N/A	26309 23288

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
126	Oil Interceptor # 7	N/A	2581 2300
127	Oil Interceptor # 8	N/A	25768 22603
128	Oil Interceptor # 9	N/A	26995 22313
129	Oil Interceptor # 10	N/A	27349 22905
130	Oil Interceptor # 11	N/A	27428 22869
131	Oil Interceptor # 12	N/A	27381 22807
132	Oil Interceptor # 13	N/A	27253 23230
133	Oil Interceptor # 14	N/A	2723 2300
134	TACAN Tower	7.4	26130 21665
135	Glide Slope	7.6	27315 23493
136	CADF Timber Poles	7.7	26640 22259
137	TIALD Laser Guided Pod Building	8.13	26511 23291
138	Gym Equipment Store	10.18	26070 23354
139	Mechanical Services Flight (PPP) Store	8.14	26378 23270
140	Flying Club Cabin	7.5 / 7.8	26119 22413
141	Revetment Cabin 41 Squadron	Removed	26107 22314
142	Standby Ops Cabin	7.8	26047 22253
143	41 TIF Cabin	7.8	26380 23187
144	Revetment Cabin	7.8	25973 22111
145	Revetment Cabin	Removed 23-10-06	27163 22562
146	Revetment Cabin	Removed 23-10-06	27230 22510
147	Precision Approach Radar (PAR)	Removed	26570 22811
148	Product Receipt Enclosure (PRE)	9.16	25961 22701
150	Plant Wash Area	N/A	2585 2292
152	Double Squash Courts	10.12	26083 23333
153	Airmen's Mess Bin Compound	N/A MOJ Site	25740 23331
154	BFI #5 Underground Tank	9.17	25896 22795
155	BFI #5 Pump House	9.17	25901 22774
156	BFI #5 Control	9.17	25915 22755
157	BFI #5 Standby Set House	9.17	25909 22746
158	BFI #5 Underground Tank	9.17	27399 22793
159	BFI #5 Pump House	9.17	27392 22772
160	BFI #5 Control	9.17	27381 22752
161	BFI #5 Standby Set House	9.17	27371 22745
162	Yardmaster IN MT Yard	N/A MOJ Site Removed	25853 22937
165	Revetment Cabin	Removed 23-10-06	27156 23074
166	Revetment Cabin	Removed 23-10-06	27138 23039
167	Standby Ops Cabin	7.8	27132 22937
168	Store	10.13	26002 23356
169	Flying Club Store Cabin	Removed 23-10-06	26120 22400
170	Revetment Cabin	Removed 23-10-06	27203 22792
171	Main Ops Cabin 6 Squadron	7.8	27299 22909
175	54 Squadron Revetment Cabin	Removed 23-10-06	27217 22701
176	54 Squadron Revetment Cabin	Removed 23-10-06	27239 22652
177	54 Squadron Line Offices	8.16	26301 22971
178	54 Squadron Workshop	8.16	26314 22965
179	54 Squadron Revetment Cabin	Removed 23-10-06	27160 22468

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
180	54 Squadron Revetment Cabin	Removed 23-10-06	27107 22440
181	54 Squadron Revetment Cabin	7.8	27158 22387
182	54 Squadron Revetment Cabin	Removed 23-10-06	27230 22511
183	Respirator Test Facility	N/A MOJ Site	25999 23057
184	Respirator Test Facility	N/A MOJ Site	26008 23054
185	Abacus Radar Mast	Unknown	Unknown
186	Motor Club Storage Cabin	Removed	26117 23201
187	Early Failure Detection Cell	9.18	26120 23210
188	Armoury Training Cell	9.2	25997 22922
189	16 Squadron Training cell	Removed 23-10-06	Unknown
190	41 Squadron Cabin	8.15	26390 23182
191	41 Squadron Drying Cabin	8.15	26381 23177
193	Gas Pressure Reducing Station	N/A MOJ Site	25736 22991
195	MAS (Uniter)	N/A MOJ Site	25957 23088
196	AMAS (Uniter)	N/A MOJ Site	26521 22067
197	Septic Tank in Explosive Storage Area	N/A	Unknown
198	Septic Tank	N/A	Unknown
199	Septic Tank	N/A	26120 22871
202 A	WRAF Barrack Block Salmon	N/A MOJ Site Removed	25622 23313
202B	WRAF Barrack Block Hanbury	N/A MOJ Site Removed	25669 23312
204	WSM Storage Garages	N/A MOJ Site Removed	26016 23161
208	Officers' Mess Refuse Compound	11.6	25516 23019
212	Officers' Mess BH Fuel Compound	N/A	25495 23009
213	Hangar 2 Heating Compound	8.12	26117 23083
214	Emergency Air Traffic Control	7.10	26860 22654
216	Hangar 4 Heating Compound	8.12	26187 23260
217	Main Workshop Paint Store	8.17	25150 23243
218A	Explosive Storage Area Pyro Store	8.7	26338 23274
218B	Explosive Storage Area Pyro Store	8.7	26329 23270
219	Compressor House	9.19	25934 22889
220	Drop Tank Storage Area	N/A	26559 22058
221	Trolley Servicing	12.8	27186 22383
222	Explosive Area Initiator Store	12.9	27335 22309
223	Ready-Use Store	12.10	27380 22470
223A	Ready-Use Store	12.10	27358 22449
223B	Ready-Use Store	12.10	27336 22428
223C	Ready-Use Store	12.10	26315 22406
224	Explosive Test	12.12	27258 22346
225	Assembly Bay	12.12	27281 22312
225A	New Arcton Chamber	12.13	27272 22309
226	Functional Test Bay	12.14	27320 22287
227	Compressor House	12.15	27258 22320
228	Electronics Test	12.12	27281 22312
229	Technical Stores	12.16	27246 22407
230	Ammonia Store	12.17	27217 22364
231	Telescramble North	7.11	27105 23845
232	Explosive Storage Area Picket Post	12.18	27209 22392

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
233	Ground Radio Maintenance Wing Ops	8.18	26213 22949
234A	Ready-Use Store	8.19	26313 22903
234B	Ready-Use Store	8.19	26325 22895
235	Emergency Water Storage Tank	12.7	27402 22436
236	East Windsock	N/a	2707 2261
237	SW Windsock	N/A	2595 2230
238	MT Toilet Block	N/A MOJ Site	25848 22973
239	Sports Pavilion	10.14	26022 23395
240	ILS Glide path	7.6	27312 23488
241	ILS Localiser	7.6	26115 22158
243	Sergeants' Mess Garages	10.15	26042 23525
244	Station Church	N/A	25531 23469
245	Station Welfare Centre	N/A	25658 23478
246	Electrical Plinth 'A'	N/A	25779 21887
247	Electrical Plinth 'B'	N/A MOJ Site	25625 23069
248	Electrical Plinth 'C'	N/A	25557 23054
249	Electrical Plinth 'D'	N/A	26205 22979
250	Electrical Plinth 'E'	N/A	26056 23000
251	Electrical Plinth 'F'	N/A	26584 23330
252	Electrical Plinth 'G'	N/A	26734 23364
253	Electrical Plinth 'H'	N/A	27107 23832
254	Electrical Plinth 'I'	N/A	27269 23228
255	Electrical Plinth 'J'	N/A	27429 22900
256	Electrical Plinth 'K'	N/A	27191 22364
257	Electrical Plinth 'L'	N/A	25970 23506
258	Electrical Plinth 'M'	N/A	26486 22087
259	Standby DSS	N/A	25835 23416
260	Brake Parachute Servicing	9.20	26115 23157
261	6 Squadron Line Hut	8.20	26193 22931
262	54 Squadron Line Hut	8.20	26250 23016
264	Supply & Movements Packaway Building	N/A MOJ Site	26031 23065
265	Air Publication Store	9.21	26054 23049
266	6 Squadron Cabin	8.21	26047 22831
267	BFI #4	8.3	26292 23327
268	Hangar 3 Boiler House	8.22	26030 22866
269	Inflammable Bays / AVPIN Store	Removed	25981 22946
270	41 Squadron Line Hut	8.20	26361 23171
271	MT Refueller Toilet	9.22	25988 22882
272	MT Refueller Office & Crew Room	9.22	25998 22868
273	MT Rest Room & Office	N/A MOJ Site	25839 22986
274	30 mm Ammunition Store	9.23	26000 22704
275	Transmitter Building	7.12	25702 22242
278	Timber Tower	Removed	27330 22904
279	Oil Store for Hangar 3 Boiler House (268)	8.22	26030 22847
280	Jaguar Training School	Removed	26447 23284
282	Compass Swing Area	N/a	27029 23524
283A	Public Support Initiative(PSI) Garages	N/A MOJ Site	25837 23227

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
286	Supply Squadron Bulk Store	N/A	25893 23010
287	Waste Oil Tanks	N/A	2596 2297
288	Waste AVTUR Store	7.13	26027 22442
289	Technical Information Flight (TIF) Chemical Store	Removed	26373 23202
291	Lightning Simulator / Supply Store	N/A MOJ Site	26011 23114
292	RAF Regiment Flight	N/A MOJ Site	25993 23084
293	MT Section	N/A MOJ Site	25816 22912
294	Refuelling Servicing Bay	N/A MOJ Site	25799 22897
295	Electronics Centre	8.23	26480 23260
296	Electronic Engineering Squadron Boiler House	8.24	26492 23305
297	Electronic Engineering Squadron Fuel Compound	8.24	26487 23306
298	Swimming Pool	10.16	26088 23291
300	No Break Set House	8.25	26232 22974
301	Bulk Fuel Installation #2	8.3	25903 22839
302	Underground EWS BFI #3	8.3	27403 22832
303	AR15 Radar	7.14	25908 22256
304	Brake Parachute Rest Room	9.24	26126 23154
305	Fire & Crash Tender Bays	8.26	26249 22992
306	Telescrumble South	7.11	26170 21670
307	ILS Middle Marker, Swanton Abbot	N/A	27893 24542
308	ILS Outer Marker, Pollard Street	N/A	33494 32626
309	Commutated Antenna Direction Finding (CADF) Building	7.15	26660 22347
310	Water Mains Meter Pit	N/A	26588 21969
311	Explosives Storage Area Toilet Block	12.19	27159 22379
312	Explosive Store Igniters	12.9	27329 22366
313	Small Arms Training Cabin	N/A MOJ Site	26020 23092
314	25 M Range Shelter	9.25	25964 22766
315	Explosives Storage Area Crew Room	12.20	27152 22370
316	Explosives Storage Area Garages	12.21	27173 22377
317	Field Kitchens	12.22	27128 22369
318	Arrestor Net '04' End	Removed	26052 21723
319	Arrestor Net '22' End	Removed	27371 23743
320	Storage Igloo	12.23	27401 22410
321	Storage Igloo	12.23	27416 22516
322	Storage Igloo	12.23	27368 22373
323	Emergency Water Supply	N/A MOJ Site	25942 23317
324	Emergency Water Supply	9.26	26059 23161
325	Emergency Water Supply	N/A MOJ Site	26013 23074
326	Emergency Water Supply	12.7	27276 22375
327	Aircraft Fire Facility	7.17	27231 23037
328	Photographic Waste Tank	N/A	Unknown
329	Photographic Waste Hardstanding	N/A	Unknown
330	Bus Shelter Barton Road	N/A	2568 2349
331	'22' RHAG	N/A	2708 2338
331B	'04' RHAG	N/A	26236 22153
332	Aircraft Washdown Tanks – Oil Trap 6	9.13	26026 22792
334	Technical Information Flight (TIF) Workshop	8.27	26341 23253

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
336	POL Office Crew Room	9.27	25954 22754
338	Redundant Building	4.5	27113 23043
340	Electrical Plinth 'P'	N/A	Unknown
341	Anemometer Tower	Removed	unknown
342	Tubular Steel Lattice Tower	8.28	26531 23110
343	Tubular Steel Lattice Tower	8.28	26431 23053
344	Tubular Steel Lattice Tower	8.28	26331 22995
345	Tubular Steel Lattice Tower	8.28	26236 22866
346	Tubular Steel Lattice Tower	8.28	26233 22752
347	Tubular Steel Lattice Tower	8.28	26229 22637
348	Electrical Plinth 'R'	N/A	25985 22661
349	Jaguar Simulator	9.28	26026 22660
349A	Int Cell	N/A	Unknown
350	Jag Simulator Boiler House	9.29	26025 22608
355	Police Flight Offices	10.18	25967 23473
356	GSES Offices	Removed	Unknown
357	Fire Prevention Offices	Removed 23-10-06	26237 22951
358	Ground Radio Offices	8.18	26208 22938
359	Uninstalled Engine Test Facility (UETF) Office	Removed	26091 22656
360	Uninstalled Engine Test Facility Locker & Crew Room	Removed	26085 22653
361	Police Flight Timber Store	10.18	25959 23490
362	Sergeants' Mess Storage Shed	N/A	25986 23480
363	Sergeants' Mess Shed	Unknown	Unknown
364	Gym Timber Shed	N/A	26037 23326
365	Timber Shed Junior Ranks Mess	N/A MOJ	Unknown
366	Timber Shed Junior Ranks Mess	N/A MOJ	Unknown
367	Timber Shed Electronics	Removed	26438 23232
368	Timber Shed Electronics	Removed	26437 23223
369	Timber Shed Store	Unknown	Unknown
370	Timber Shed Store	Unknown	Unknown
371	Timber Shed Store	Unknown	Unknown
372	Clay Pigeon Shooting Hut #1	Removed	26882 22666
373	Clay Pigeon Shooting Hut #2	Removed	26914 22641
374	Clay Pigeon Shooting Hut #3	Removed	26947 22616
375	VHF / UHF Radio Receiving Building	7.16	27319 22901
376	Paint Spray Facility	9.30	25868 22867
377	Education Centre	10.17	25895 23413
378	AC Paint Spray Facility	9.31	26057 22787
379	Oil Trap #19	N/A	26074 21604
380	Quickway Warehouse	8.29	26344 23321
381	TIF	8.30	26340 23218
382	TIF Store	8.30	26353 23204
383	Prop Man Conference Centre	N/A	Unknown
384	Radio Transmitting Building	7.16	26364 23581
385	Abacus Mast	Demolished	26373 23572
386	PACF New Store	8.31	26138 23235
387	Ops Wing Complex		26222 22939

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
388	Domestic Supply Flight Shed	N/A	Unknown
389	Families Centre Ormesby Road	N/A	25685 23850
391	Domestic Supply Flight Store 50 Fifers Lane	N/A	Unknown
395	Watchman Radar Tower	7.12	25708 22225
396	Watchman Radar Cabin	Removed	25713 22218
397	EES Locker Room	8.32	26473 23233
398	Paint Spray Locker Room	Demolished	26045 22775
399	Foam Interceptor	7.17	27229 23072
400	Fire Practice Burning Area	7.17	27220 23038
401	Packed POL Hazardous Area	7.19	26052 22478
402	Filby Road Gate	N/A	Unknown
403	Dental Centre	10.5	26041 23309
404	Colt Bowl	N/A MOJ Site	25834 23313
405	Help Information Volunteer Exchange (HIVE)	N/A	Unknown
406	42–53 Ormesby Road Flats	N/A	25622 23758
407	177–188 Ormesby Road	N/A	25642 23879
408	Amenities Centre Ormesby Road	N/A	Unknown
409	Defence Housing Executive (DHE) Office	N/A	Unknown
413	Malan House	N/A	Unknown
414	Deere House	N/A	Unknown
415	Hybrid Antenna Tower	7.16	27319 22893
416	AGSEE Wash	12.24	27181 22395
418	Station Training Area	N/A	27172 22963
419	EWS Tank	9.26	26071 22557
420	Memorial Stone	N/A	Unknown
424	Engineering Wing Cabin Control	7.18	27162 23017
425	Ops Wing Flying Clothing	7.18	27278 22905
427		Removed	26173 23259
428	Main Cabin Jag AEDIT	Removed	26227 23266
429	Publications Store / Workshop	Removed	26213 23265
430	JAG AEDIT Office	Removed	26220 23275
431	Motor Transport Supply Squadron Cabin	Removed 23-10-06	Unknown
432	54 Squadron Locker Room Cabin	Removed 23-10-06	Unknown
433	Shed Adjacent North ASP	Removed	Unknown
434	Shed Adjacent North ASP	Removed	Unknown
435	Aircraft Wash Cabin	9.13	26062 22739
436	Met Office Cloud Level Detect	N/A	26265 22958
437	Met Office Equipment	N/A	26248 22936
438	Shed Adjacent to (17)	N/A	Unknown
439	Timber Shed	N/A	Unknown
440	16 Squadron Line	9.32	26095 22634
441	16 Squadron POL Store	9.33	26097 22616
443	Portacabin (40)	N/A	Unknown
444	Portacabin (SHQ)	N/A	Unknown
445	Portacabin (gym)	Removed 23-10-06	Unknown
446	Portacabin (Fire Section)	N/A	Unknown
466	Balloon Shed	N/A	Unknown

Summary of RAF Coltishall Buildings for the year 2000 (contd)			
Bdlg	Description	Report Part	NGR (all TG)
467	Johnson Block	Removed 23-10-06	Unknown
468	Aircrew Feeder		26068 23038
469	MT Portacabin	Removed 23-10-06	Unknown
470	Armoury Cabin North	Removed	Unknown
471	Armoury Cabin South	Removed	Unknown
476	Replacement Precision Approach Radar		
477	Foam Store	7.17	27245 23084
478	Foam Store Water Storage Tank	7.17	27244 23077
479	Fresco Tower	Unknown	Unknown
510	Air-Raid Shelter – Officers’ Mess	3.11	25622 22988
511	Air-Raid Shelter – Between (33 & 35)	3.11	26002 23327
512	Air-Raid Shelter – SW of (265)	3.11	26034 23042
513	Air-Raid Shelter – (14) ‘E’	3.11	25915 22949
514	Air-Raid Shelter – (35) ‘F’	3.11	25978 23402
515	Air-Raid Shelter – East of (40)	3.11	25975 23496
516	Air-Raid Shelter – South of (286)	3.11	25873 22988
517	Air-Raid Shelter – SE of (15)	3.11	26091 23114
518	Air-Raid Shelter – W of (324)	3.11	26047 23162
519	Air-Raid Shelter – SW (78)	3.11	26164 23274
520	Air-Raid Shelter – S of (281) ‘L’	3.11	26128 23260
521	Air-Raid Shelter – E of (250) ‘N’	3.11	26037 22992
522	Air-Raid Shelter – N of (16) ‘O’	3.11	26198 22982
523	Air-Raid Shelter – S of (93)	3.11	26786 23369
524	Air-Raid Shelter – Revetment ‘P’	3.11	26785 23368
525	Air-Raid Shelter – N side of ESA gate	3.11	27194 22403
526	Air-Raid Shelter – West of BFI #3	3.11	27364 22852

SOURCES

The National Archives Sources

(note that not all of the TNA files were inspected)

AIR 2/11042	Unit badge: Coltishall	1951–53
AIR 2/13871	Deployment policy: Coltishall	1945–73
AIR 2/17228	Coltishall	1965–72
AIR 2/17292	Coltishall organisation policy	1964–69
AIR 2/18934	Hurricanes, Spitfires and other historic aircraft; transfer of the Battle of Britain Memorial Flight from Coltishall to Coningsby	1975–77
AIR 20/11185	Coltishall: visit of HRH Princess Margaret, 7 May 1963	1962–63
AIR 20/8542	Lands and accommodation finance matters: Coltishall	1938–70
AIR 77/195	Report on the Coltishall experiment	1957
AIR 28/168	Coltishall	1940–43
AIR 28/169	Coltishall	1944–45
AIR 28/1008	Coltishall	1946–55
AIR 28/1343	Coltishall	1956–60
AIR 28/1344	COLTISHALL. Includes 14 photographs depicting: aircraft landing; RAF contingent marching in Norwich for opening of BoB week; Lord Mayor of Norwich taking salute after church parade together with senior officers of HQ Eastern Sector	1957–60
AIR 28/1561	Coltishall	1961–65
AIR 28/1562	Coltishall	1961–63
AIR 28/1992	Coltishall	1974–75
AIR 28/2160	Coltishall	1966
AIR 28/2205	Coltishall	1976–77
AIR 28/2206	RAF Coltishall	1978–80
AIR 29/4516	226 Operational Conversion Unit Coltishall	1970–71
AIR 29/4517	226 Operational Conversion Unit Coltishall	1972–74
AIR 29/59	5133 (Bomb Disposal) Squadron,	1944–50
AIR 29/76	2719 Squadron, RAF Regiment,	1942–46
AIR 29/78	725 Defence Squadron, 1942	1945
AIR 29/80	2735 Squadron RAF Regiment,	1942–45
AIR 29/103	2812 (Anti-Aircraft) Squadron RAF Regiment.	1942–45
AIR 29/125	2885 (Anti-Aircraft) Squadron RAF Regiment. Formed from 4287, 4299 and 4300 Anti-Aircraft Flights. Based at various UK stations including Drem (East Lothian) and Coltishall (Norfolk).	1943
AIR 29/440	3206 Servicing Commando. Formed at Odiham then moved to other UK locations including Coltishall and Aston Down; later moved to France, Belgium and the Netherlands (Holland).	1943–45
AIR 29/860	Station Flight, Coltishall, UK.	1944
AIR 29/936	Fighter Sector Headquarters Coltishall (UK), formed at Horsham St Faith	1945
AIR 29/1394	3603, Barton Quarry unit moved to Coltishall June 1950	1948–50
AIR 29/3568	CSDE, Swanton Morley. Includes 14 photographs depicting Central Servicing Development Establishment, Swanton Morley, appraisal of field test set for use in Firestreak missiles first line servicing, views of equipment attached to missile; plan of fire control test set and equipment designed at Coltishall.	1963
AIR 50/450	Coltishall Wing 64 Squadron	1943

RAF Coltishall Parts 1 to 7

AIR 19/1004	Air estimates. Includes 12 photographs depicting (1) Strategic mobility troops disembarking in N Africa during exercise 'Starlight' (2) Lightnings of 74 Sqn, RAF Coltishall in formation flight and one stationery on tarmac (3) Twin Pioneer aircraft coming in to land (4) Bloodhound missile in flight	1961–62
AVIA 75/20	Coltishall Aerodrome (transferred from DR 4/292 1	1959–72
AVIA 5/29	Type Mosquito 36 (RL-249); Location near Coltishall Report No. W2440	1949 Feb
AVIA 5/34	Type Venom NF2 (WR-784); Location Coltishall; Report No.S2757	1955 May
AVIA 5/35	Type Venom NF3 (WX-881); Location Coltishall; Report No.S2825	1956 June
AVIA 5/37	Type Javelin F (AW) 4 (XA-734); Location Coltishall; Report No.S2908	1958 Feb
AVIA 5/39	Type Lightning 1 (XM-138); Location Coltishall; Report No.S2998	1960 June
AVIA 101/681	Lightning T4 (XM 971) near Coltishall on 2 January 1967 AIB and RAF reports and proceedings of Board of Inquiry	1967
BT 233/6	Beaufighter X (RD 778) Coltishall,	8 February 1950
BT 233/155	Vampire NF10, (WM671) Coltishall,	9 June 1953
BT 233/276	Venom NF2, (WR784) Coltishall,	19 May 1955
BT 233/318	Venom NF3, (WX795) Coltishall,	16 Jan 1956
BT 233/344	Venom NF3, (WX881) 3 miles south west of Coltishall,	5 June 1956
DSIR 12/309	Runway extension at Coltishall Airfield laid in continuous reinforced concrete construction	1959
DEFE 71/285	RAF Coltishall organisation	1972 –79
MAF 32/713/586	Parish No. 586 Parish Coltishall	1941–43
WO 166/7921	Royal Artillery Sector Operations Room, Coltishall	1942

In-house Site plans

12386/38	12388/38	12391/38	2315/39	2321/39
2322/39	2323/39	2324/39	5561/39	5562/39
5563/39	84294/44	2279/49	2280/49	1825/50
3099/50	3461/50	2908/53	7209B/53	4943A/54
WA7/87/54	WA7/24/55	WA7/25/55	8683A/56	8684A/56
11759A/58	WA7/254/58	3182/62K	3183/62K	S/288/72
NAO/2/72	NAO/146/75/2	S536/84	S537/84	

In-house Drawings

Revetment Hardstanding – Running-Up platform for Lightning Aircraft	CSD/1
New TACAN Building	CU (M&E) 1587A
TACAN Self-Supporting Steel Towers	5242C/61N
Siting PAR (SLA.3C Standing & Marker Details	809/62F
New VHF / UHF Transmitting Building & Tower	WA7/68/61
VHF/UHF Receiving Building & Tower Site Plan	WA7/69/61
Static PAR Standing	11124G/61 (O)
Commuted Antennae Direction Finding Building	1830/59
Traffic Signal Installation for Taxiways	CU (M&E) 1103
Frangible RVR Tower	DCED (CE) 7/84
Accommodation for 6, 41 and 54 Squadrons, Dispersed Sites	860043 (1)
Accommodation for 6, 41 and 54 Squadrons, Dispersed Site Operations	860043 (2)
Localiser Sites	S1591A/71

In-house Documents

Airfield Pavements Maintenance Inspection	1991
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ARG Documents

AP 3236 Works	1956
AP 3397 Maintenance	March 1966
Sommerfeld Track, track laying diagrams	?
Civil Engineer in War Volume 1: Airfields, Roads, Railways & Bridges	1947

